

| | | | | |
|--------------------|---------|---------|------------|-----------------------|
| Revue suisse Zool. | Tome 94 | Fasc. 4 | p. 765-817 | Genève, décembre 1987 |
|--------------------|---------|---------|------------|-----------------------|

Neue und interessante Milben aus dem Genfer Museum LX. Oribatids from Sabah (East Malaysia) II. (Acari: Oribatida)

by

S. MAHUNKA *

With 124 figures

ABSTRACT

New and interesting mites from the Geneva Museum LX. Oribatids from Sabah (East Malaysia) II (Acari: Oribatida). — 36 species are identified, 23 of them and 1 subspecies are described as new to science. For 4 species it was necessary to establish new genera: *Berndotritia* gen. n. (*Oribotritiidae*), *Sabahtritia* gen. n. (*Sabahtritiidae* fam. n.), *Suctotegeus* gen. n. (*Microtegeidae*) and *Interoppia* gen. n. (*Oppiidae*). The taxonomical importance of the peloptoid chelicera and the labiogenal articulation are emphasized and zoogeographical considerations on the Oribatid fauna of South-East Asia, including New Guinea, are given.

INTRODUCTION

The regular soil zoological collectings in the past decades covering the best part of the world make it possible to assess the world Oribatids so much that in many instances they are ready for evaluation. In the present state of affairs it is striking to note lack of data concerning apparently small, though rather important zoogeographical regions. It is the task of the future to explore as quickly as possible the fauna of these *terrae incognitae*, making thereby an even better survey possible.

Especially many of these blank spots are found in the zoogeographically rather disjointed region of the orient, whose borders are rather problematic especially towards the

* Zoological Department, Hungarian Natural History Museum, Baross utca 13, H-1088 Budapest, Hungary.

Australian faunal realm. Furthermore, the subdivisions of the Oriental Region are not settled as yet, and concerning the soil fauna there has not even been an attempt to draw the limits. The origin and relations of the soil mite fauna prevailing there have not yet been solved either. Therefore the goal that had been set by Dr. B. Hauser custos of the Muséum d'Histoire naturelle Geneva, is of great importance, namely to make extensive collectings in Sabah (North Borneo) in order to explore the soil mite fauna living there.

The soil fauna of Sabah, similiary to the fauna of the whole of Borneo, is yet unexplored. Besides our publications in print (MAHUNKA 1987; MAHUNKA & MAHUNKA-PAPP 1987) which elaborate the materials collected by Dr. Hauser, it was only RAMSAY & SHEALS (1969) who described two new genera and four new species and subspecies of Pycnima from a material collected by two expeditions organized by the British Royal Society (North Borneo Expeditions in 1961 and 1964).

The fauna of the nearby areas important for the fauna of Sabah is somewhat better known. Besides the regional elaborations, listed below, several smaller contributions exist. The more comprehensive ones are concerning the Malay Peninsula (BALOGH & MAHUNKA 1974) the Philippines (CORPUS-RAROS 1979-1980), Thailand (AOKI 1965, 1966), Fiji (HAMMER 1971), Sumatra (BERLESE 1914, WILLMANN 1931, SELLNICK 1925, 1930), Java (SELLNICK 1925, CSISZÁR 1961, BALOGH 1961, HAMMER 1979, 1981), Sunda Is. (MAHUNKA 1977, HAMMER 1982), New Guinea (BALOGH 1968, 1970). These contributions together with some smaller papers give substantial basis for faunal comparison and evaluation.

The material given for study, for which I most heartily thank the collector, represents very well the fauna of Sabah, since the material is derived from several biotopes and from various altitudes. The soil, litter, moss and other samples have been extracted by the Berlese funnel and partly by the Moczarszky-Winkler apparatus, and the obtained mite samples proved to be very rich indeed. Although I have so far elaborated only a portion of the material it is striking to note the high number of supraspecific taxa. So far I have identified 36 species, of which 24 species and 1 subspecies are new to science, for the new taxa four new genera had to be erected and even one new family name is introduced.

TAXONOMICAL AND ZOOGEOGRAPHICAL REMARKS

We are at the beginning of the elaboration so it would be premature to draw far-reaching conclusions, but the occurrence of some taxa already now arouse special attention.

1. It is a systematic peculiarity to include a new genus, *Suctotegeus* gen. n., in the so far monotypic family of *Microtegeidae* Balogh, 1972 which genus is characterized by its peloptoid chelicera and the labiogenal articulation being of suctorial type. A similar phenomenon is known in several other families, e.g. in *Basilobelbidae* with the genera *Basilobelba* Balogh, 1958 and *Xyphobelba* Csiszár, 1961, in the family *Dampfiellidae* with the genera *Dampfiella* Sellnick, 1931 and *Beckiella* Grandjean, 1964, or in the family *Oppiidae* the recently discovered *Xenoppia* Mahunka, 1982 and in the family *Multoribulidae* the genera *Multoribula* Balogh et Mahunka, 1966 and *Suctoribula* Mahunka, 1984.

This series quite clearly exemplifies parallel evolution, and it is highly probable that in several other instances we shall be compelled to consider it when making decisions in relating well known taxa. Thus, for example, it is very probable that the genus *Hexoppia* Balogh, 1958 belonging in the family *Oppiidae* Grandjean, 1954 should rather be ranked

in the family *Suctobelbidae* inspite of having normal, diarthric labiogenal articulation; furthermore, the separation of the family *Galumnellidae* on the basis of the peloptoid chelicera from the other *Galumnida* genera may be problematic.

2. The presence of species common with Sumatra and Java was expected, but it was rather surprising to find the two following species *Gressittolus marginatus* Balogh, 1970 and *Hardybodes mirabilis* Balogh, 1970, which were originally described from New Guinea. This somewhat indicates that the fauna of Sabah and that of New Guinea have more elements in common than it might otherwise have been supposed, suggesting that our previous concept concerning regional borders, based on the study of other animal groups, will have to be reconsidered.

LIST OF LOCALITIES

- Sab-82/5: Sabah (Sandakan Residency): Sepilok (15 milles [24 km] à l'ouest de Sandakan): "Kabili-Sepilok Forest Reserve" (KSFR), forêt près de l'"Orang-Utan Rehabilitation Station" (OURS), Lowland Dipterocarp Forest, prélèvement de bois pourri, 30 m, 23.IV.1982 (B*)
- Sab-82/15: Sabah (West Coast Residency): Mt-Kinabalu: "Bukit Ular Trail" (sentier reliant la "Kambarangan Road" à la "Power Station"), forêt de *Lithocarpus-Castanopsis*, tamisage de feuilles mortes et de bois pourri, 1790 m, 28.IV.1982 (W**)
- Sab-82/27: Sabah (Sandakan Residency): Sepilok: KSFR, forêt près de l'OURS, tamisage de feuilles mortes et de bois pourri prélevés dans les angles formés par les contreforts ailés de grands arbres, 30 m, 3.V.1982 (W)
- Sab-82/34: Sabah (Sandakan Residency): Sepilok: KSFR, forêt près de l'OURS, prélèvement de sol dans le pré autour de la cabane ("Cottage") dans une ancienne plantation d'hévéas, 2 m, 7.V.1982 (B)
- Sab-82/41: Sabah (Sandakan Residency): Sepilok: KSFR, forêt près du "Pond" (étang formant la réserve d'eau pour Sepilok), Secondary Lowland Forest, prélèvement de feuilles mortes, 10.V.1982 (B)

LIST OF SPECIES

Hypochthoniidae Berlese, 1910

Malacoangelia remigera Berlese, 1913

Localities: Sab-82/27: 1 specimen; Sab-82/41: 1 specimen

Mesoplophoridae Ewing, 1917

Apoplophora heterotricha sp. n.

Localities: Sab-82/27; Sab-82/41

Apoplophora lineata sp. n.

Locality: Sab-82/15

* B: extraction par appareil BERLESE.

** W: extraction par appareil WINKLER-MOCZARSKI.

Apoplophora spinosa sp. n.

Localities: Sab-82/41; Sab-82/27

Mesoplophora villosa sp. n.

Locality: Sab-82/5-II

Lohmanniidae Berlese, 1916

Haplacarus rugosus sp. n.

Locality: Sab-82/41

Vepracarus ramosus Balogh, 1961

Locality: Sab-82/34: 3 specimens (see Figs 19-25)

Epilohmanniidae Oudemans, 1923

Epilohmannia flagellifer sp. n.

Locality: Sab-82/41

Oribotritiidae Grandjean, 1954

Austrotritia shealsi sp. n.

Locality: Sab-82/27

Berndotritia bulbifer gen. n., sp. n.

Locality: Sab-82/27

Indotritia krakatauensis (Sellnick, 1925)

Locality: Sab-82/34: 3 specimens

Sabahtritiidae fam. nov.

Sabahtritia hauseri gen. n., sp. n.

Locality: Sab-82/34

Trhypochthoniidae Willmann, 1931

Archegozetes longisetus Aoki, 1965

Locality: Sab-82/27: 12 specimens

Cepheidae Berlese, 1896

Sadocepheus elevatus sp. n.

Localities: Sab-82/27; Sab-82/41

Microtegeidae Balogh, 1972

Microtegeus sabahnus sp. n.

Locality: Sab-82/27

Suctotegeus tumescitus gen. n., sp. n.

Localities: Sab-82/27; Sab-82/41

Microzetidae Grandjean, 1936*Microzetes tuberculatus* sp. n.

Locality: Sab-82/41

Damaeolidae Grandjean, 1965*Gressittolus marginatus* Balogh, 1970

Locality: Sab-82/5-II: 10 specimens

Eremobelbidae Balogh, 1961*Eremobelba heterotricha* Mahunka, 1975

Locality: Sab-82/27: 2 specimens

Metrioppiidae Balogh, 1943*Furcoppia horakae* sp. n.

Locality: Sab-82/27

Carabodidae C. L. Koch, 1837*Congocepheus orientalis* sp. n.

Locality: Sab-82/27

Hardybodes mirabilis Balogh, 1970

Localities: Sab-82/27: 2 specimens; Sab-82/41: 5 specimens

Yoshiobodes aokii sp. n.

Localities: Sab-82/34; Sab-82/41

Yoshiobodes arcuatus sp. n.

Locality: Sab-82/41

Oppiidae Grandjean, 1954*Arcoppia bidentata sabahensis* ssp. n.

Locality: Sab-82/27

Interoppia mirabilis gen. n., sp. n.

Locality: Sab-82/27

Oppia sundensis Hammer, 1979

Locality: Sab-82/34: 1 specimen

Oppiella nova (Oudemans, 1902)

Locality: Sab-82/34: 1 specimen

Pulchroppia burckhardti sp. n.

Locality: Sab-82/27

Oxyameridae Aoki, 1965*Oxyamerus hauserorum* sp. n.

Localities: Sab-82/41; Sab-82/5-II

Machadobelbidae Balogh, 1972*Machadobelba spathulifer* sp. n.

L o c a l i t y : Sab-82/41

Oribatulidae Thor, 1929*Brassiella reticulata* (Oudemans, 1916)

L o c a l i t y : Sab-82/27: 1 specimen

Haplozetidae Grandjean, 1936*Nixozetes (Philippizetes) corpusarrosae* sp. n.

L o c a l i t i e s : Sab-82/27; Sab-82/34

Rostrozetes nagaii sp. n.

L o c a l i t y : Sab-82/27

Oribatellidae Jacot, 1925*Lamellobates orientalis* Csiszár, 1961

L o c a l i t y : Sab-82/27: 13 specimens (see Figs 114-117)

Oribatella malaya Balogh et Mahunka, 1974

L o c a l i t y : Sab-82/27: 9 specimens

DESCRIPTIONS

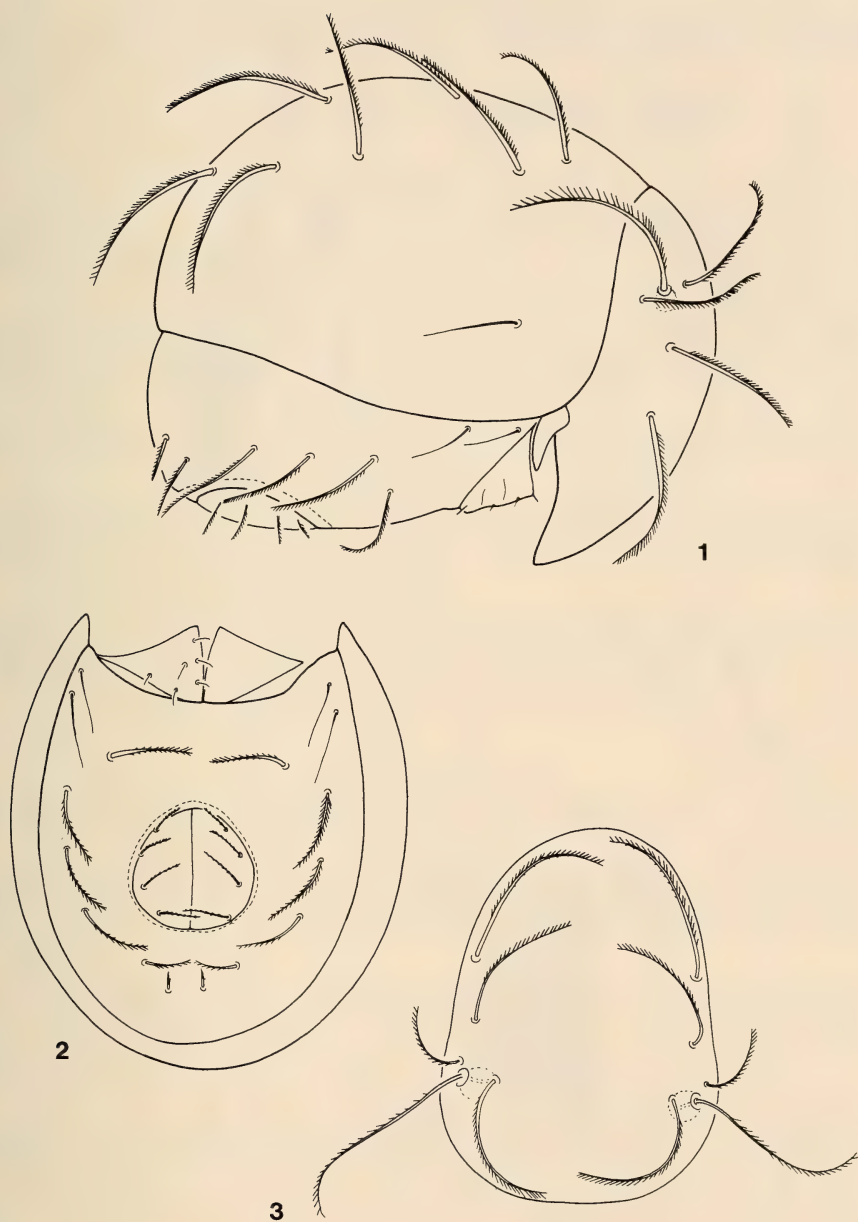
Apoplophora heterotricha sp. n.

M e a s u r e m e n t s : Length of aspis: 212-224 μm , length of "notogaster": 270-285 μm , height of "notogaster": 193-208 μm .

A s p i s (Fig. 3): Surface smooth, without longitudinal striation. All setae strong, slightly thickened basally, well ciliate, cilia comparatively short and originating very near to each other. Sensillus with longer cilia distally and shorter ones basally.

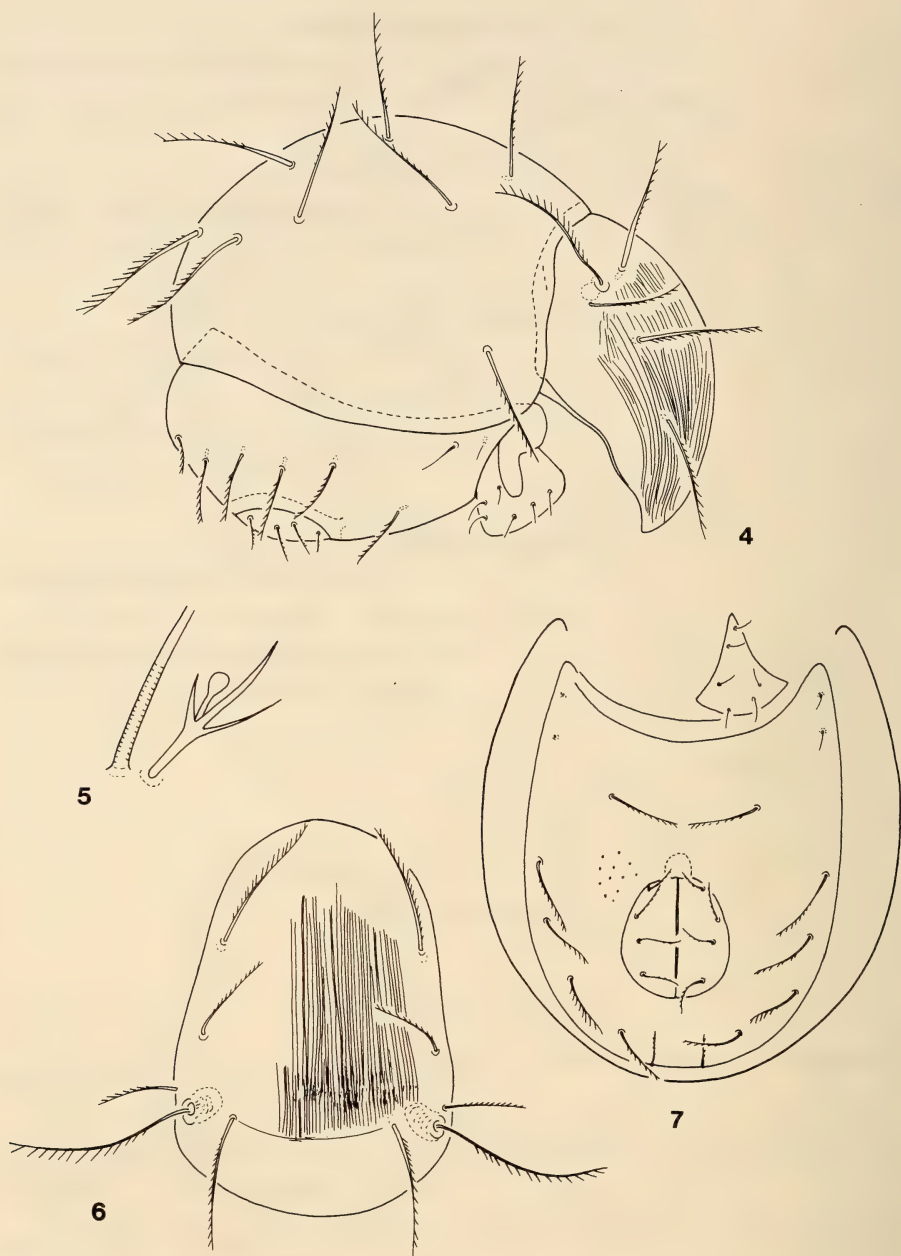
N o t o g a s t e r (Fig. 1): Eight pairs of notogastral setae of different lengths, all similar to prodorsal ones, excepting setae c_3 . Setae c_3 quite different, much thinner than the others and smooth.

A n o g e n i t a l r e g i o n (Fig. 2): Altogether eight pairs of "ventral" setae. Two pairs in aggenital position, both pairs much thinner than the others. Six pairs originating around the anal plates, setae v_1 slightly thickened, v_2 longer than v_1 , but much shorter than v_3 .



FIGS 1-3.

Apoplophora heterotricha sp. n. — 1: lateral side; 2: anogenital region; 3: aspis.



FIGS 4-7.

Apoplophora lineata sp. n. — 4: lateral side; 5: ε of tarsus I; 6: aspis; 7: anogenital region.

Material examined: Holotype: Sab-82/27; 7 paratypes: from the same sample, 2 paratypes: Sab-82/41. Holotype and 5 paratypes: MHNG *; 4 paratypes (917-PO-83): HNHN **.

Remark: See comments after the last *Apoplophora* species.

***Apoplophora lineata* sp. n.**

Measurements: Length of aspis: 356-380 μm , length of "notogaster": 480-502 μm , height of "notogaster": 340-356 μm .

Aspis (Fig. 6): Distinctly striated, only a thin lateral and a larger basal part of notogaster without such sculpture. Prodorsal setae strong, erect, basally slightly thickened, well ciliate. Cilia gradually becoming longer but scarcer towards the distal end of setae, the last cilium usually longer than the end of the seta.

Notogaster (Fig. 4): Eight pairs of strong setae being similar to prodorsal ones, but especially d_1 and e_1 thicker basally than the other ones.

Anogenital region (Fig. 7): Six pairs of setae in "adanal" position. With the exception of the posterior one, all nearly equal in length, all thin, and well ciliate. Four pairs of anal and six pairs of genital setae, two pairs in aggenital position. Among the anal setae an_1 nearly twice as long as an_4 .

Material examined: Holotype: Sab-82/15; 6 paratypes: from the same sample. Holotype and 4 paratypes: MHNG; 2 paratypes (918-PO-83): HNHN.

Remark: See comments after the last *Apoplophora* species.

***Apoplophora spinosa* sp. n.**

Measurements: Length of aspis: 207-218 μm , length of "notogaster": 272-290 μm , height of "notogaster": 168-183 μm .

Aspis (Fig. 10): All setae short, pectinately ciliate. Lamellar and interlamellar setae nearly equal in length, rostral one slightly longer, exobothridial one slightly shorter than the preceding pair. Sensillus thin, distinctly ciliate. Prodorsal surface without ornamentation.

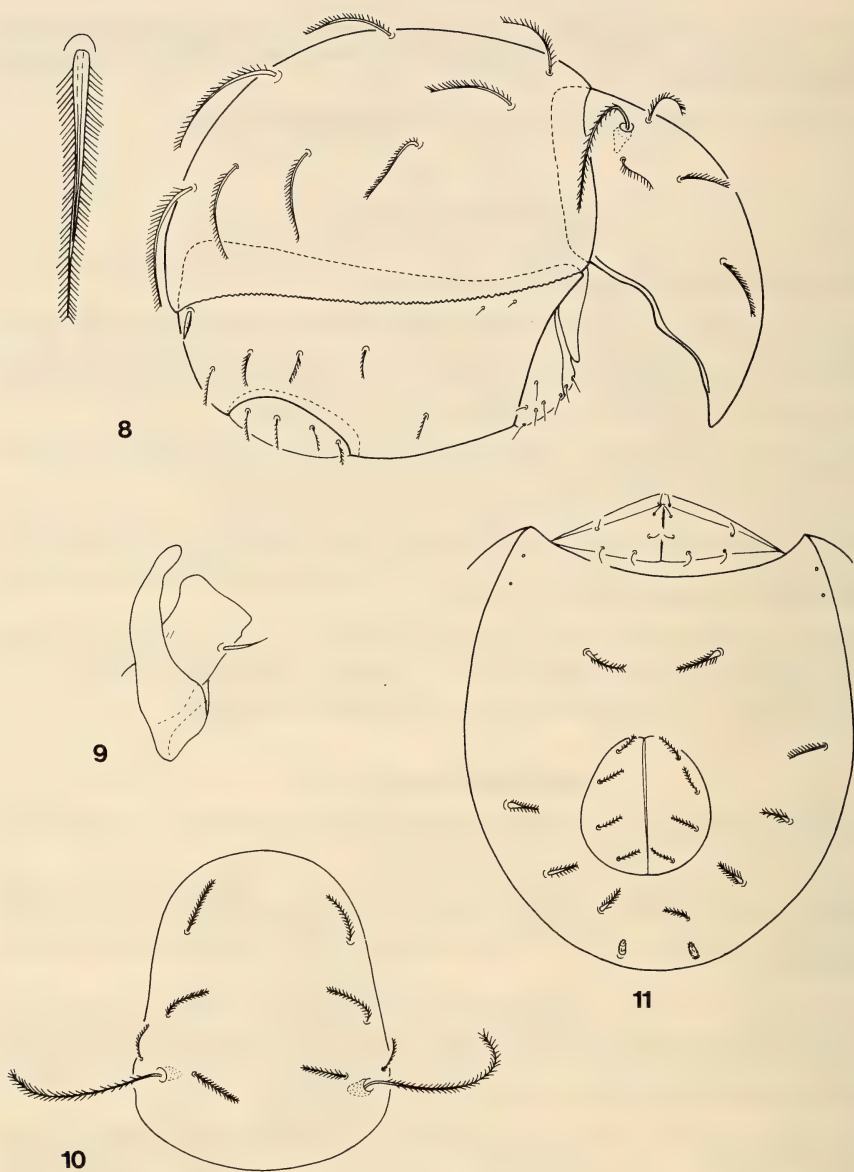
Notogaster (Fig. 8): Lateral margin finely serrated. All notogastral setae short, slightly dilated basally, also pectinately ciliate on both margins (detail of Fig. 8). Setae c_3 originating far from the collar margin. Setae e_1 and e_2 slightly longer than the other ones, being nearly equal in length.

Ventral side (Fig. 11): Anal opening removed far from the genital one. Only six pairs of "ventral" setae, "aggenital" setae lacking. The posterior "adanal setae" shorter and thicker than the other ones, spiniform, the others similar to notogastral setae.

Legs: A very large apophysis on femur IV (Fig. 9), femur III with a much smaller one.

* MHNG = deposited in the Muséum d'Histoire naturelle, Genève.

** HNHN = deposited in the Hungarian Natural History Museum, Budapest, with identification number of the specimens in the Collection of Arachnida.



FIGS 8-11.

Apoplophora spinosa sp. n. — 8: lateral side; 9: process of femur IV;
10: aspis; 11: anogenital region.

Material examined: Holotype: Sab-82/41; 17 paratypes: from the same sample, 13 paratypes: Sab-82/27. Holotype and 11 paratypes: MHNG; 11 paratypes (919-PO-83): HHNM.

Key to the species of *Apoplophora* Aoki, 1980

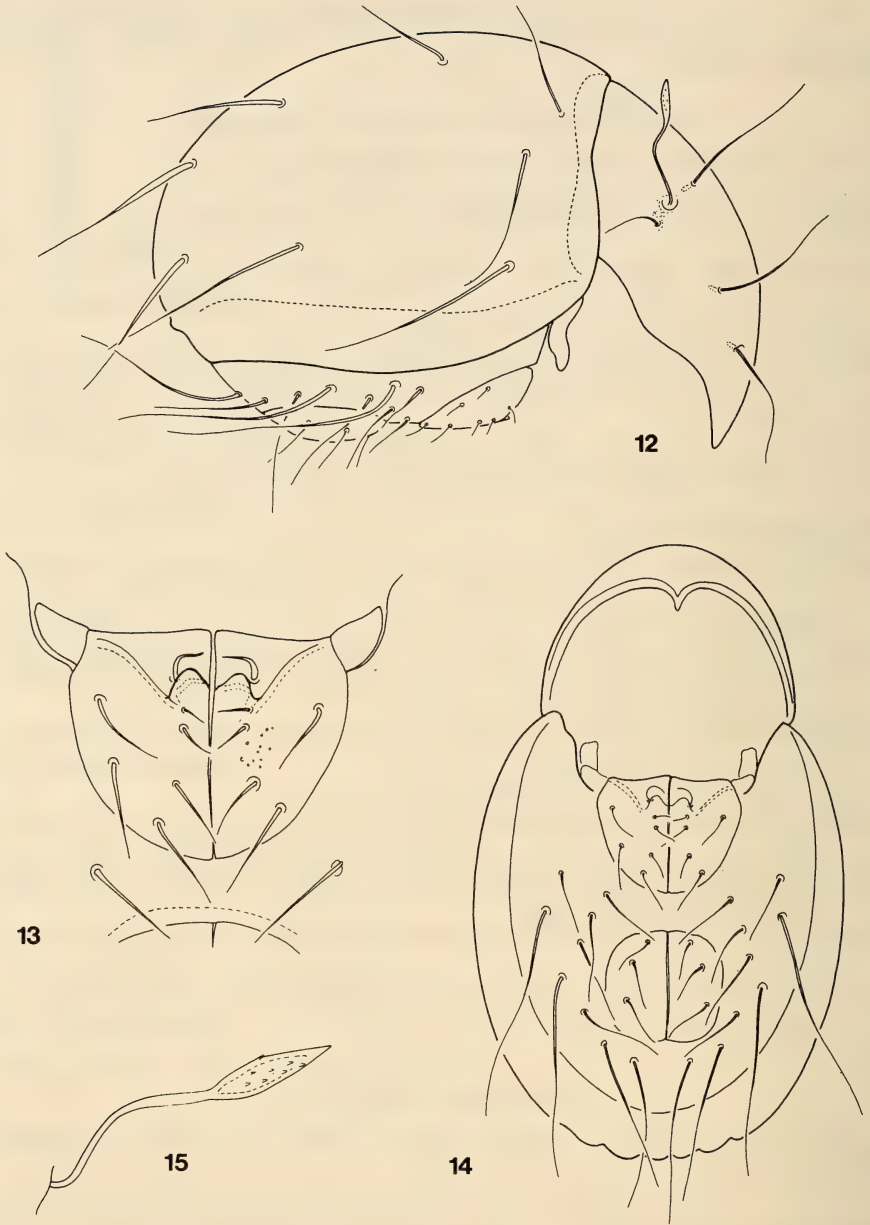
- 1 (8) Aspis distinctly striated or lineated longitudinally.
- 2 (5) One or 0 pair of setae in aggenital position.
- 3 (4) One pair of setae in aggenital position. Anal plates smooth *remota* Aoki, 1980
- 4 (3) No setae in aggenital position. Anal plates densely striped *rostrorugosa* Hammer, 1979
- 5 (2) Two pairs of setae in aggenital position.
- 6 (7) Setae v_1 and v_2 equal in length. Cilia of notogastral setae very long and becoming scarcer on the distal end of setae, and gradually shorter towards base of setae *lineata* sp. n.
- 7 (6) Setae v_1 only half as long as v_2 . Cilia of notogastral setae shorter and originating nearer to each other than in the preceding species *striata* (Mahunka, 1985)
- 8 (1) Aspis without sculpture.
- 9 (10) The hindmost setae of the "ventral" plate (v_1) very short, spiniform, originating very far from all others, which are also short, not longer than the distance between them *spinosa* sp. n.
- 10 (9) The hindmost setae (v_1) of the ventral plate not spiniform, if slightly thicker than originating near to anal opening. The other "ventral" setae are much longer than the distance between them.
- 11 (12) All notogastral setae thin, simple, without pectinate ciliation. One very long seta on the "ventral plate" *leviseta* Hammer, 1979
- 12 (11) Notogastral setae with pectinate ciliation.
- 13 (14) All ventral setae nearly equal in length. Only one pair of setae in aggenital position *pantotrema* (Berlese, 1913) sensu Hammer, 1979
- 14 (13) Ventral setae of different lengths, setae v_1 only half as long as v_3 . Two pairs of setae in aggenital position.
- 15 (16) Setae c_3 thinner than other notogastral ones, not ciliate, setae v_3 - v_6 very long, v_2 only half as long *heterotricha* sp. n.
- 16 (15) All notogastral setae of equal length and shape. No such great difference between setae v_2 and v_3 *indica* (Mahunka, 1985)

Mesoplophora villosa sp. n.

Measurements: Length of aspis: 190-202 μ m, length of notogaster: 260-272 μ m, height of notogaster: 170-180 μ m.

Aspis: Prodorsum smooth. All setae fine, flagellate. Exobothridial setae shorter than the others. Sensillus (Fig. 15) with lanceolate head, some minute squamae on its surface.

Notogaster (Fig. 12): Eight pairs of notogastral setae, great differences in length existing among them. Setae c_1 , d_1 the shortest, setae c_3 , d_3 , e_2 the longest. Seta e_1 and e_2 slightly thickened basally. Notogastral surface with some deep furrows longitudinally, well visible in ventral view on the posterior border of body.



FIGS 12-15.

Mesoplophora villosa sp. n. — 12: lateral side; 13: genital plates; 14: ventral side; 15: sensillus.

Anogenital region (Fig. 14): Genital plates with a pair of flap-like protrances medially (Fig. 13), before them one pair of setae, behind them 6 (5) pairs of genital setae present. "Ventral plate", bearing 9 pairs of mostly very long setae.

Material examined: Holotype: Sab-82/5-II; 25 paratypes: from the same sample. Holotype and 15 paratypes: MHNG; 10 paratypes (920-PO-83): HNHM.

Remarks: The new species is well characterized by the deep furrows of the notogaster and the very long notogastral setae. Similar features are unknown among the actually known *Mesoplophora* Sellnick, 1922 species.

***Haplacarus rugosus* sp. n.**

Measurements: Length: 615-720 μm , width: 405-446 μm .

Dorsal side (Fig. 18): Rostrum rounded. All prodorsal setae simple, short, nearly equal in length. Sensillus thin, pectinate with 12-14 short branches. A medially thick transversal band behind the interlamellar setae present consisting of small, punctate polygonal fields. Notogaster with very thick, well-chitinized lateral margin, surface with a transversal band consisting also of punctate foveolae or polygonal fields. All sixteen pairs of notogastral setae thin and simple, only very small differences existing in lengths. Pygidial part of notogaster rugose, mostly with transversal rugae.

Ventral side (Fig. 17): Mental setae well ciliate, all longer than epimeral ones. Epimeral setal formula: 3-1-3-4. Surface of epimeres with some foveolae, their number and position constant. Epimere very wide, above legs 4 a long process directed laterally. Genital plates (Fig. 18) very wide, both plates together much wider than their length. Preanal plate also wide and thick. Ano-adanal setal formula: (4: 1). Surface of ano-adanal plates with strong longitudinal rugae. All setae of anogenital region simple.

Material examined: Holotype: Sab-82/41; 6 paratypes: from the same sample. Holotype and 4 paratypes: MHNG; 2 paratypes (921-PO-83): HNHM.

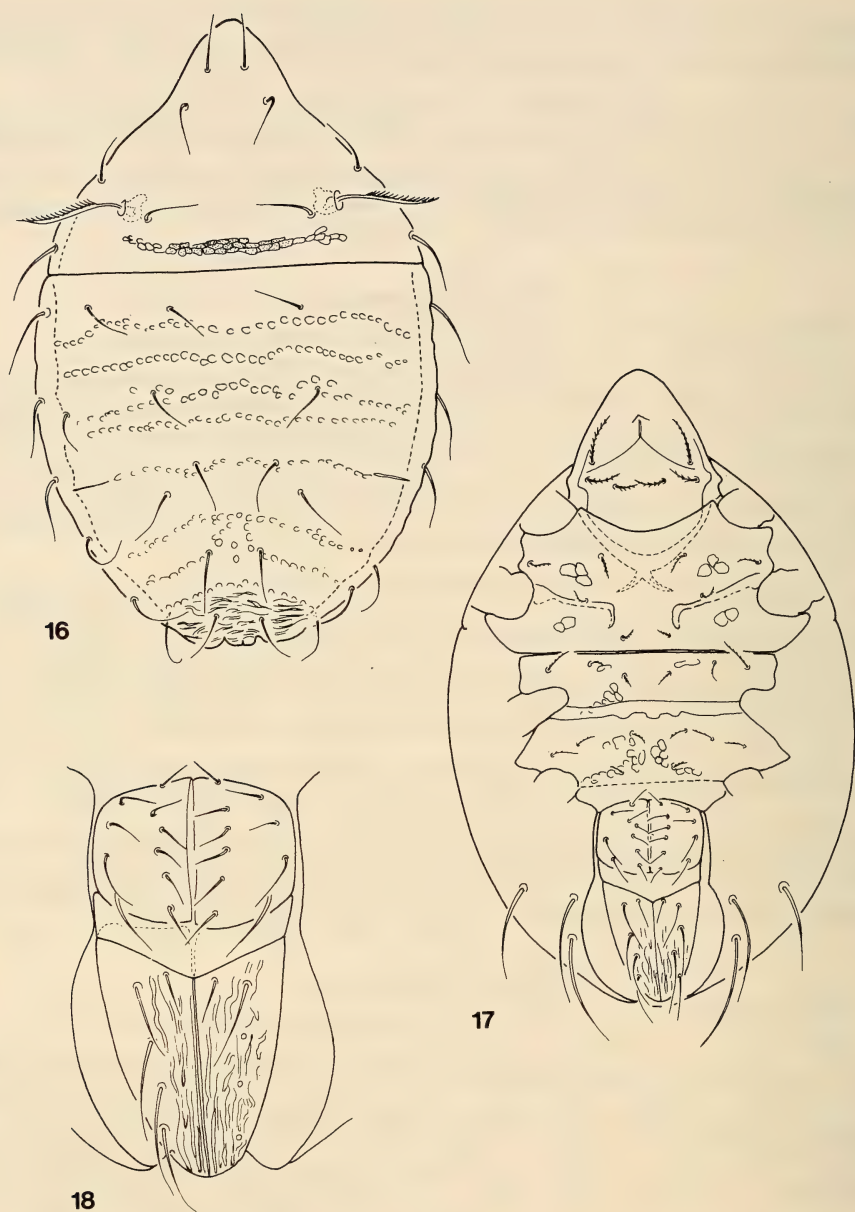
Remarks: The new species is ranged into the genus *Haplacarus* Wallwork, 1961 owing to its anogenital region. All other characteristics are wholly different from those of the known species. It is well distinguished from the others by the rugosity of pygidium and of ano-adanal plates, and by the simple notogastral setae.

***Epilohmannia flagellifer* sp. n.**

Measurements: Length: 351-520 μm , width: 185-267 μm .

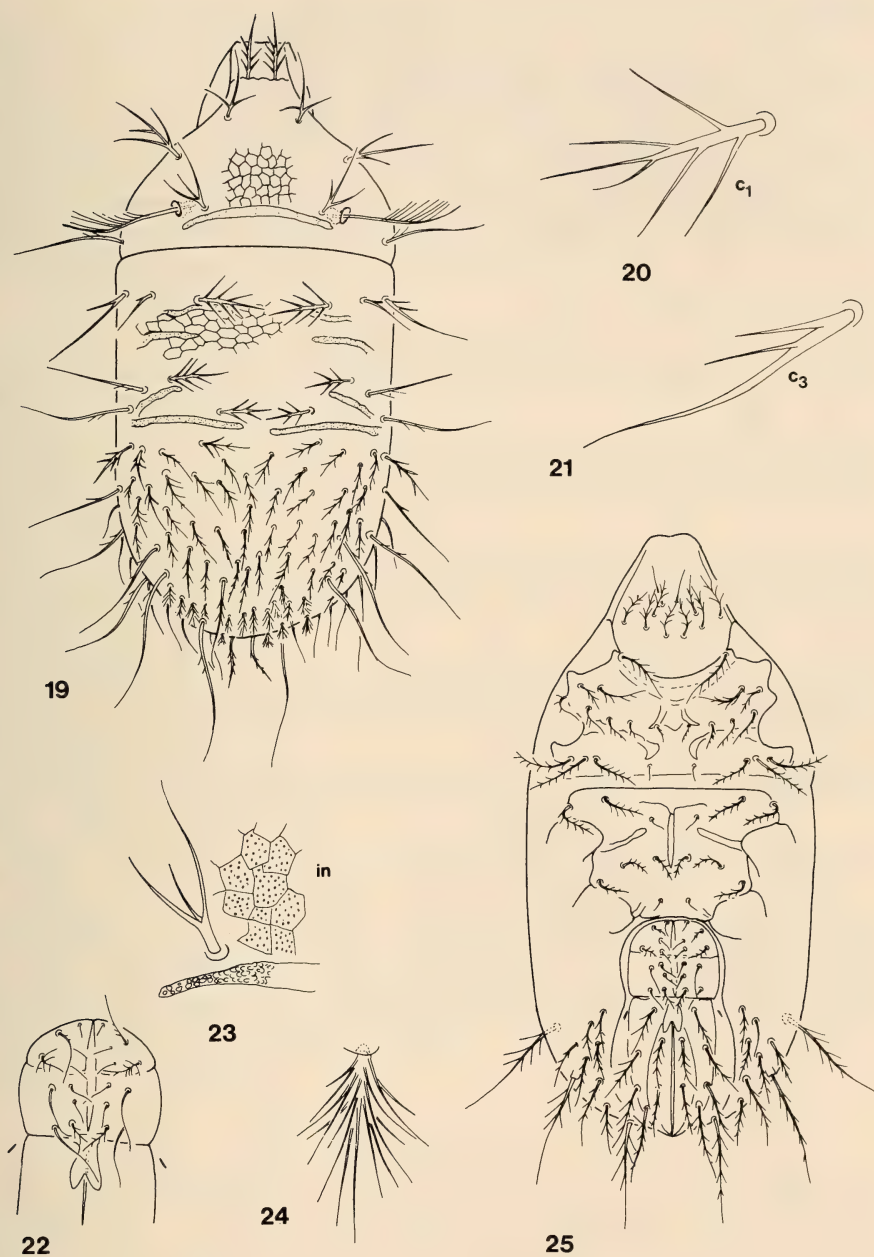
Dorsal side: Rostral, lamellar and exobothridial setae thin, simple and short, interlamellar setae thick, erect and much longer than the preceding ones, with long cilia. Surface of prodorsum and notogaster finely foveolate. Sensillus long, setiform, however, its distal part very slightly, gradually dilated. Fourteen pairs of notogastral setae present — excepting c_3 , x_2 and x_3 — all long, and flagelliform, no essential difference among them. The latter three pairs shorter, c_3 also flagelliform, x_2 and x_3 stout (Fig. 26).

Ventral side (Fig. 28): Epimeral ridge very short, hardly discernible. Apodemes 1 not connected medially. Epimeres 1 and 2, or 3 and 4 without special differences in their form and size, surface foveolate. All epimeral setae conspicuously long, especially long are the setae of epimere 3. Epimeral setal formula: 3-1-4-3. Three pairs of aggenital, eight pairs of genital, three pairs of anal and again three pairs of adanal setae present. Genital setae shorter than the others.



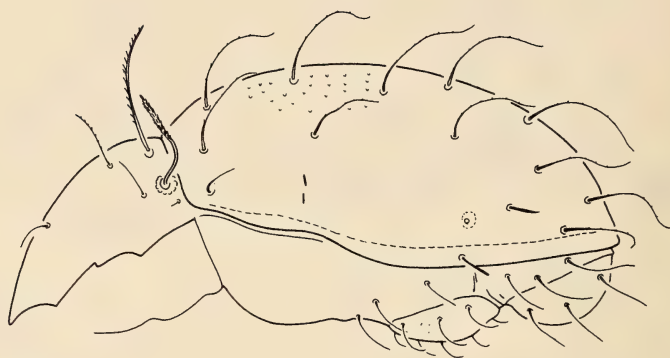
FIGS 16-18.

Haplacar rugosus sp. n. — 16: dorsal side; 17: ventral side; 18: anogenital region.

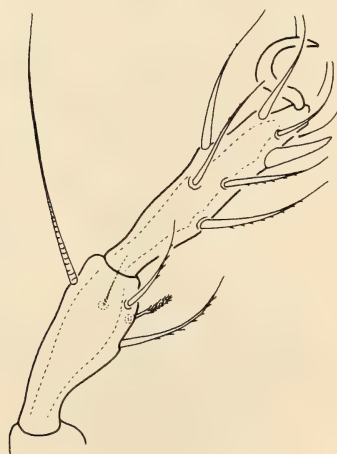


FIGS 19-25.

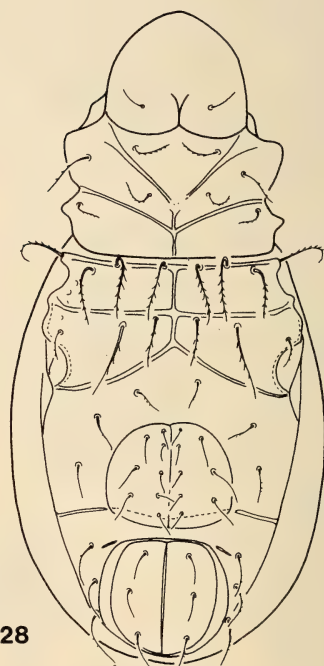
Vepracarus ramosus Balogh, 1961 — 19: dorsal side; 20: seta c_1 ; 21: seta c_3 ; 22: genital plate; 23: seta *in*; 24: neotrichial seta; 25: ventral side.



26



27



28

FIGS 26-28.

Epilohmannia flagellifer sp. n. — 26: lateral side; 27: leg IV; 28: ventral side.

Legs: Tibia of leg IV (Fig. 27) bearing four pairs of setae and 1 solenidium. Tarsus with only one modified, spiniform seta.

Material examined: Holotype: Sab-82/41; 32 paratypes from the same sample. Holotype and 20 paratypes: MHNG; 12 paratypes (922-PO-83): HNHM.

Remarks: The new species belongs to the subgenus *Sinolohmannia* Balogh et Mahunka, 1979, owing to the four setae and one solenidium on fourth tibia. However, the *Sinolohmannia* species have at least one spiniformly modified seta which is missing in the new species. On this ground and the number of epimeral setae the new species is well distinguishable from its congeners.

***Austrotrititia shealsi* sp. n.**

Measurements: Length of aspis: 346-420 μm , length of notogaster: 594-773 μm , height of notogaster: 445-515 μm .

Aspis (Fig. 32): Flat in lateral view, only anterior and basal part slightly convex. Two strong lateral carinae present, inner one very thick, appearing to the double. Rostral and interlamellar setae erect, pointed at tip, lamellar setae slightly longer, but much thinner than interlamellar ones. Sensillus setiform.

Notogaster (Fig. 29): Fourteen pairs of notogastral setae present. Thirteen pairs pointed at tip (Fig. 31), finely barbed, setae c_3 flagellate (Fig. 30) much thinner, but longer than the others.

Anogenital region (Fig. 33): Nine pairs of genital and two pairs of aggenital setae present, setae g_1 and g_2 originating very far from each other, setae g_3 and g_4 very near to each other. One pair of anal and three pairs of adanal setae, ad_1 much shorter than ad_3 .

Legs: Origin of solenidia of leg I similar to that of *Austrotrititia kinabaluensis* Ramsay et Sheals, 1969, solenidium of tarsus II coupled with seta *ft*.

Material examined: Holotype: Sab-82/27; 12 paratypes: from the same sample. Holotype and 8 paratypes: MHNG; 4 paratypes (923-PO-83): HNHM.

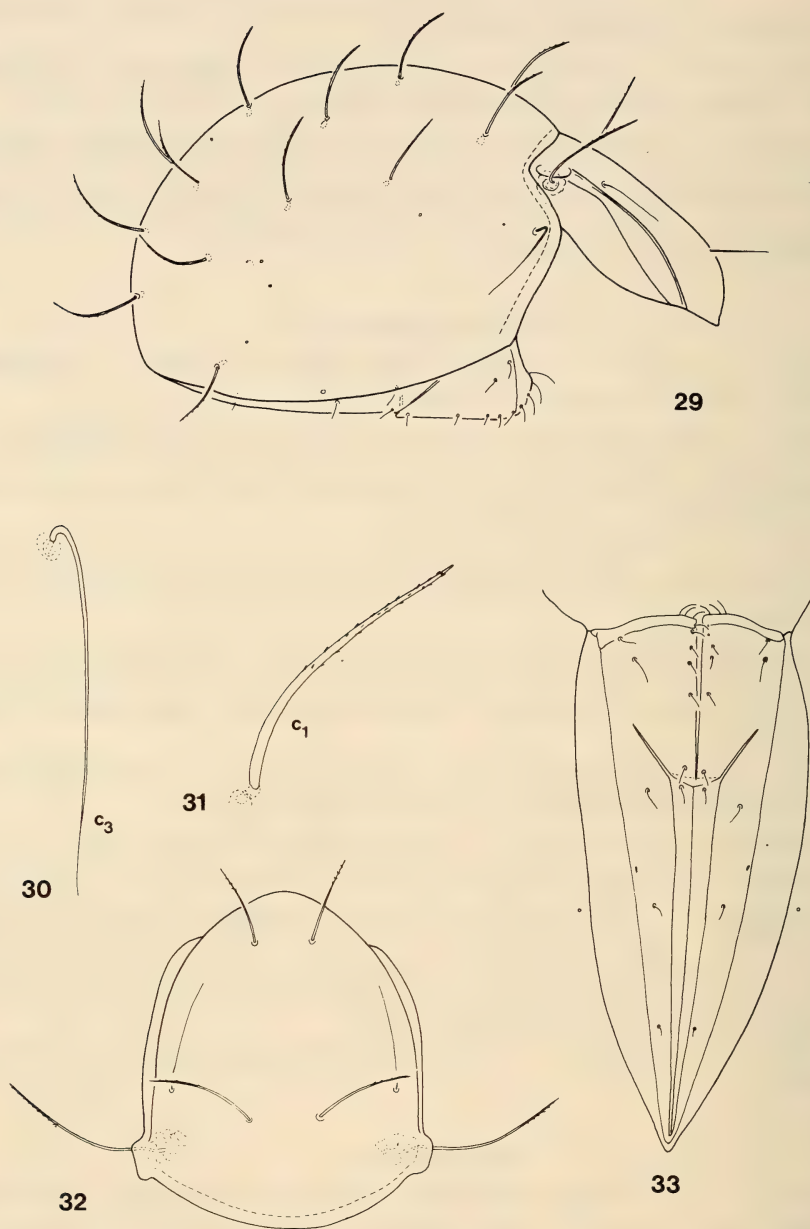
Remarks: The new species is well ranged in the genus *Austrotrititia* Sellnick, 1959. It belongs — with *A. gibba* Bayoumi et Mahunka, 1979 and *A. ishigakaiensis* Aoki, 1980 — to a species group, which may be characterized by the two lateral carinae and the setiform not dilated sensillus. The new species is distinguished from the other two by the different type of prodorsal and notogastral setae.

I dedicate the new species to Dr. J. G. Sheals, the first explorer of the Oribatid fauna of Sabah.

***Berndotrititia* gen. n.**

Diagnosis: Family *Oribotritiidae*. Similar to *Oribotrititia* Jacot, 1925. Aspis with lateral keels. Bothridial squama situated above bothridium. Fourteen pairs of notogastral setae, among them h_3 in postero-marginal position, as are setae ps_2 and ps_3 ; so setal row *ps* not in apoanal position. Anal and adanal, genital and aggenital plates well separated. Aggenital suture present. Eight pairs of genital, two pairs of aggenital, one pair of anal and three pairs of adanal setae. Palp 4-jointed (Fig. 35). Genu IV with solenidium.

Type-species: *Berndotrititia bulbifer* sp. n.



FIGS 29-33.

Austrotrititia shealsi sp. n. — 29: lateral side; 30: seta c_3 ; 31: seta c_1 ;
32: aspis; 33: anogenital region.

Remarks: The new genus is very close to *Oribotritia* Jacot, 1925 however, its palp consists only of four joints and setae *ps* arise in postero-lateral and not in apoanal position.

I dedicate the new taxon to Dr. Bernd Hauser for having collected this outstanding Oribatid material and for his help in my taxonomical work.

Berndotritia bulbifer sp. n.

Measurements: Length of aspis: 272-322 μm , length of notogaster: 504-545 μm , width of notogaster: 396-465 μm .

Aspis (Fig. 36): With fine striation anteriorly. Rostral and interlamellar setae erect, latter slightly longer. Lamellar setae thinner and curving forwards. Three lateral carinae on each side, two running close to each other, one curving to lateral margin. Sensillus bulbiform basally, with a long, setiform end.

Notogaster (Fig. 34): All fourteen pairs of notogastral setae — with the exception of c_3 — nearly equal, curved forwards, finely ciliate, as interlamellar setae; c_3 thin, setiform, much longer than all the others. Pori *ia*, *ip* clearly, pori *ih* not visible.

Anogenital region (Fig. 38): Eight pairs of genital, two pairs of aggenital setae. Aggenital suture short, but well perceptible. Anal setae minute, represented only by insertion points. Three pairs of adanal setae, all thin, but well visible.

Legs: All legs with three claws. Solenidium ω_3 originating basally, near to posterior margin of tarsus (Fig. 37). Solenidium of genu IV long. Palp with four joints.

Material examined: Holotype: Sab-82/27; 12 paratypes: from the same sample. Holotype and 8 paratypes: MHNG; 4 paratypes (924-PO-83): HNHM.

Remarks: The new species is well characterized — besides the generic diagnostic characters — by the bulbiform sensillus and the three pairs of lateral keels on aspis.

Sabahtritiidae fam. n.

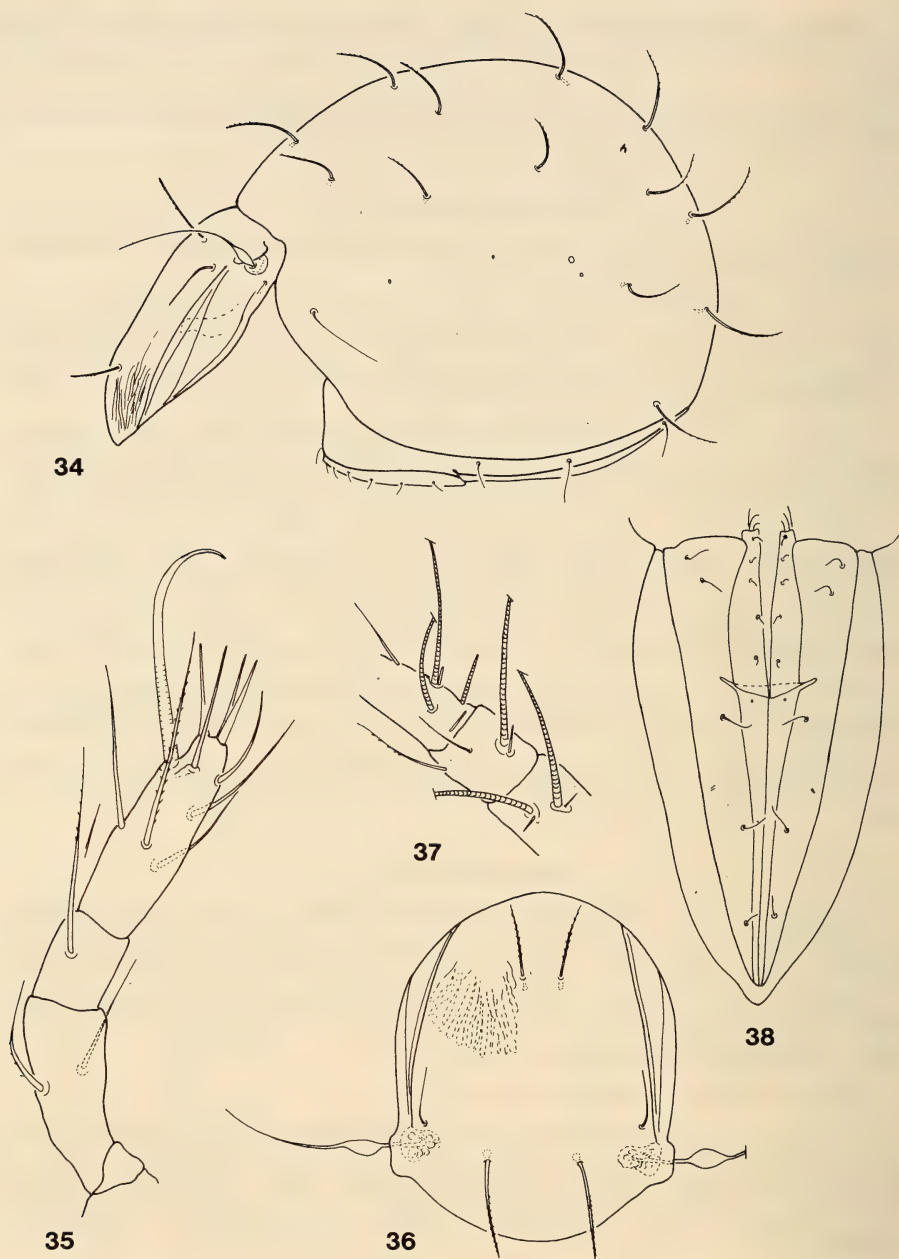
Diagnosis: Superfamily *Euphthiracaroidae*. Ventral plate missing. Anogenital region only with two plates, consequently, anal and adanal, genital and aggenital plates totally fused, only a pair of small plates in pregenital position (= pregenital plates) separated. A deep hollow in the anterior part of anogenital plates present. One pair of genital setae widened, very strong, on pregenital plates 3-4 pairs of minute setae visible. Palp comprising 3 joints.

Type-genus: *Sabahtritia* gen. n.

Remarks. The superfamily *Euphthiracaroidae* Jacot, 1930 so far has included three families: *Euphthiracaridae* Jacot, 1930, *Oribotritiidae* Grandjean, 1954 and *Synichotritiidae* Walker, 1964. The new taxon possesses some very important characters which were emphasized in the preceding diagnosis, so the erection of a new family is inevitable.

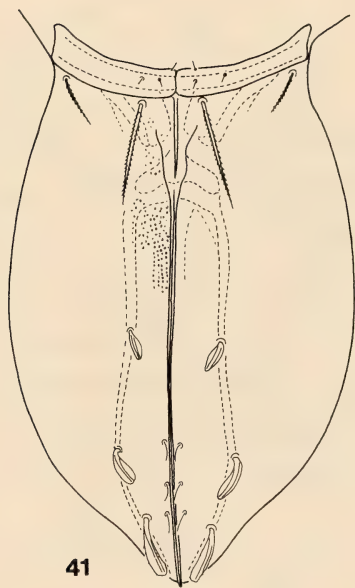
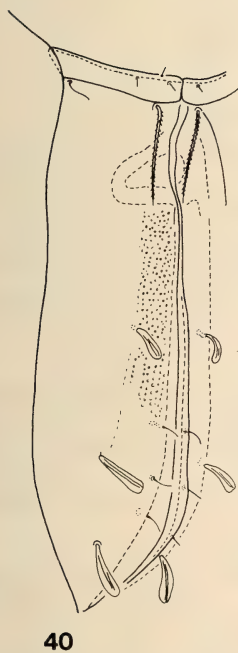
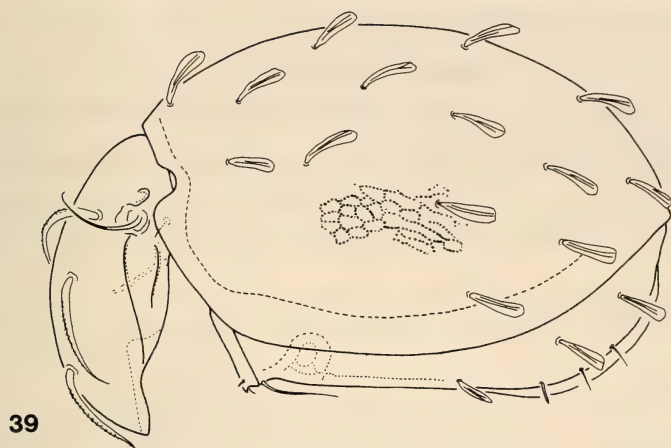
Sabahtritia gen. n.

Diagnosis: See the diagnosis of the new family. Bothridial squama situated above bothridium. Fourteen pairs of phylliform notogastral setae, surface of body covered by a polygonal sculpture consisting of granules. Three pairs of anal, three pairs



FIGS 34-38.

Berndotritia bulbifer gen. n., sp. n. — 34: lateral side; 35: palpus;
36: aspis; 37: basal part of tarsus I; 38: anogenital region.



FIGS 39-41.

Sabahtritia hauseri gen. n., sp. n. — 39: lateral side; 40-41: anogenital region (different view).

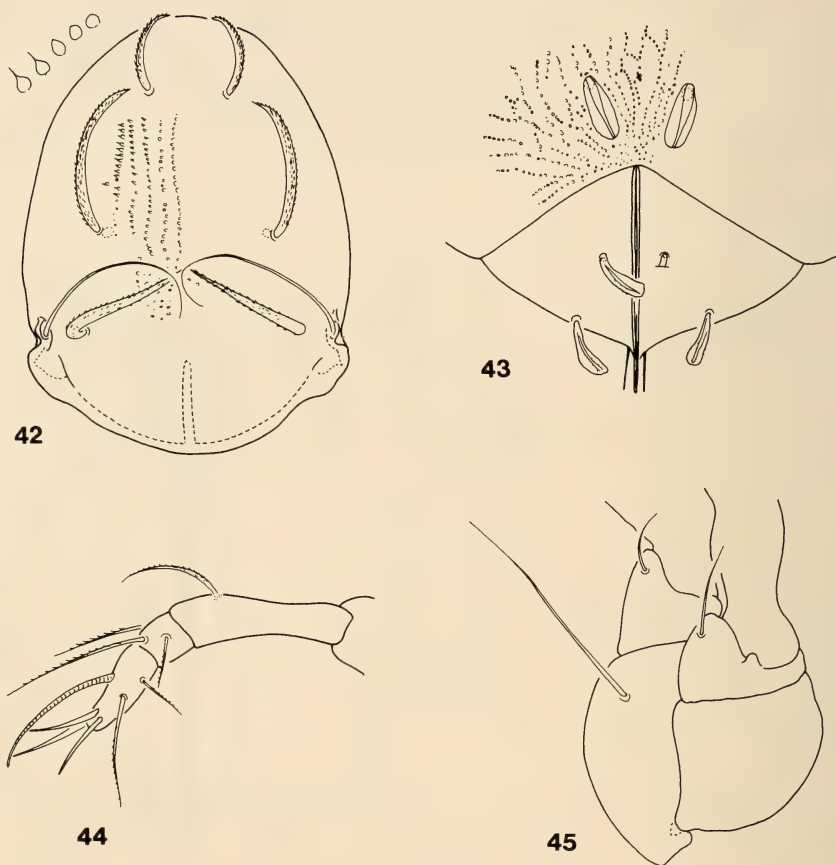
of adanal, one pair of aggenital and 4-5 pairs of genital setae, one of the latter strongly thickened. Epimeral setal formula: 3-0-2-2 (?) *. All legs with one claw.

Type-species: *Sabahtritia hauseri* sp. n.

***Sabahtritia hauseri* sp. n.**

Measurements: Length of aspis: 203-322 μ m, length of notogaster: 247-570 μ m, height of notogaster: 198-347 μ m.

Aspis (Fig. 42): Wide in dorsal and convex in lateral view. One thin lateral keel on each side, a short, curved marginal line on basal part. Bothridial squama situated above and behind bothridium. Sensillus very long, curved, setiform. All prodorsal setae



FIGS 42-45.

Sabahtritia hauseri gen. n., sp. n. — 42: aspis; 43: end of body from posteriorly; 44: palpus; 45: coxae of legs I-II.

* Only one specimen was examined.

very thick and finely barbed. The granules of the anterior and lateral parts of aspis elongated in to sharply pointed spines arranged dorsally in longitudinal rows.

Notogaster (Fig. 39): With a deep rounded incision laterally, its surface with polygonal granulation as on aspis. All notogastral setae spatulate, equal in size.

Anogenital region (Figs 40-41): Pregenital plates well separated, with 3-4 short setae. Anogenital plates with 8 pairs of setae, one of them in aggenital, one very thick and long in genital, three thin in anal and three spatulate in adanal position. The plates with a sharp edge on their inner margin, it is seen very well in posterior view (Fig. 43).

Legs: All with one large claw. Genu III with one, genu IV without solenidium. Palpus shown in Fig. 44.

Material examined: Holotype: Sab-82/34; 5 paratypes (1 broken in pieces): from the same sample. Holotype and 3 paratypes: MHNG; 2 paratypes (925-PO-83); HHNM.

Remarks: On the ground of its many particular features the new species may not be brought in relation with any other Euphthiracaroid taxon.

I dedicate the new species to my friend Dr. B. Hauser who contributed very much to the knowledge of the soil fauna of South-East Asia.

***Sadocepheus elevatus* sp. n.**

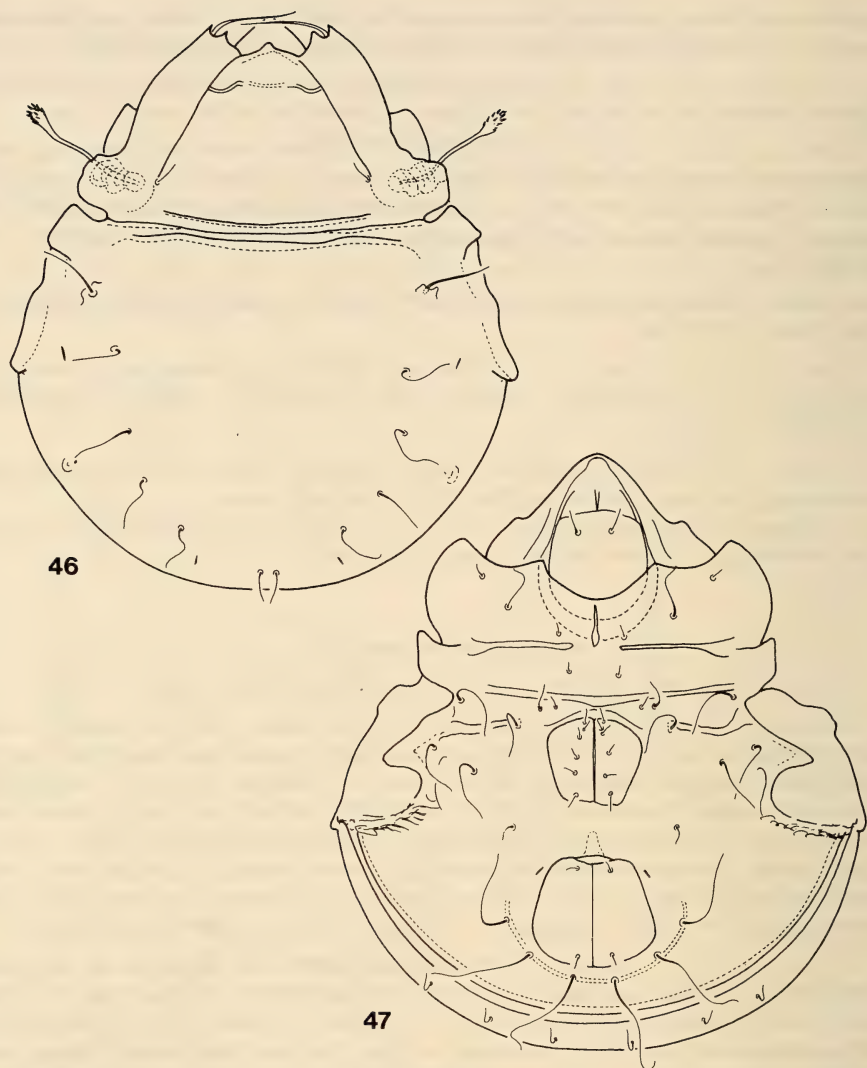
Measurement: Length: 542-591 μ m, width: 486-518 μ m.

Dorsal side (Fig. 46): Rostrum conical, rostral setae thin, lamellar setae slightly thickened. Lamellae well developed, their deeply incised apex bears two sharply pointed teeth. Lamellar setae arsing between them. Interlamellar setae short, originating on the inner margin of lamellae (Fig. 48). Sensillus (Fig. 49) long with slightly dilated and spinulose head. Dorseosejugal suture thin medially, but before and behind a thick transversal lath present. Notogastral shoulder projecting outwards, strongly chitinized with a well framed cavity laterally, its border ending opposite to a similarly chitinous lath of the epimeral region. Pedotecta I large but not elongated and not wider than pedotecta II.

Ventral side (Fig. 47): Transversal apodemes well developed, *ap. sej.* connected medially. Sternal apodeme short, only a short but basally thickened part visible in front of *ap. 2*. Epimeral setal formula: 3-1-3-3. Six pairs of genital, one pair of similarly short aggenital setae present. Adanal setae very long, thin and flagellate, all arising on a semicircular chitinous lath. Setae *1b* much longer than *1a* or *1c*, *3a* and *3b* originating conspicuously near to each other, both pairs short, *3c*, *4a-4c* long and curved.

Material examined: Holotype: Sab-82/27; 2 paratypes: from the same sample; 3 paratypes: Sab-82/41. Holotype and 3 paratypes: MHNG; 2 paratypes (926-PO-83): HHNM.

Remarks: The generic system of the family *Cepheidae* Berlese, 1896 is strongly problematic, some of the very nearly related taxa were described recently: *Sadocepheus* Aoki, 1965, *Hamotegeus* Balogh et Mahunka, 1969 and *Compactozetes* Hammer, 1966. The new species may be ranged into *Sadocepheus*, however, some of its very important characters are different; of course, it is possible, that some of them have been overlooked by AOKI, as the number of notogastral setae, the shape of pedotecta IV or the shape of

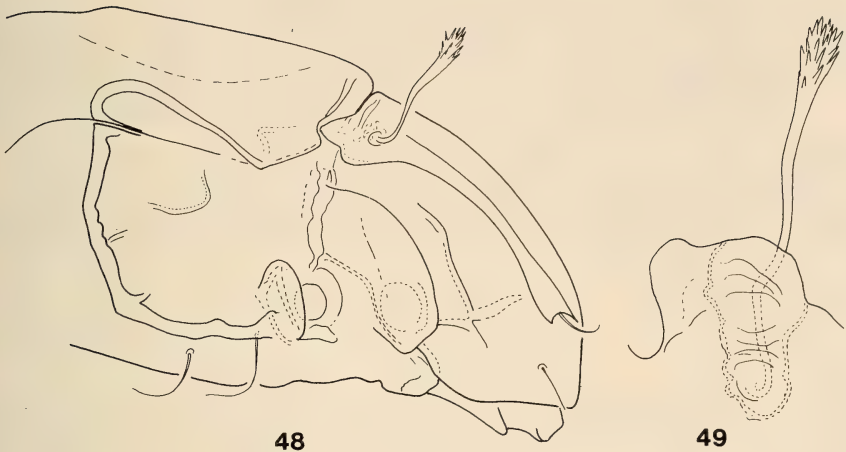


FIGS 46-47.

Sadocephus elevatus sp. n. — 46: dorsal side; 47: ventral side.

apodemes. It is clear that *Compactozetes serratus* Balogh, 1970 * also belongs to this genus, so today the genus *Sadocephus* includes three species. The new species is well distinguished from the other two by the much wider interlamellar area, the simple pedotecta II-III (?) and by the long adanal setae.

* *Sadocephus serratus* (Balogh, 1970) comb. nov. = *Compactozetes serratus* Balogh, 1970.



FIGS 48-49.

Sadocepheus elevatus sp. n. — 48: lateral view; 49: sensillus.

***Microtegeus sabahnus* sp. n.**

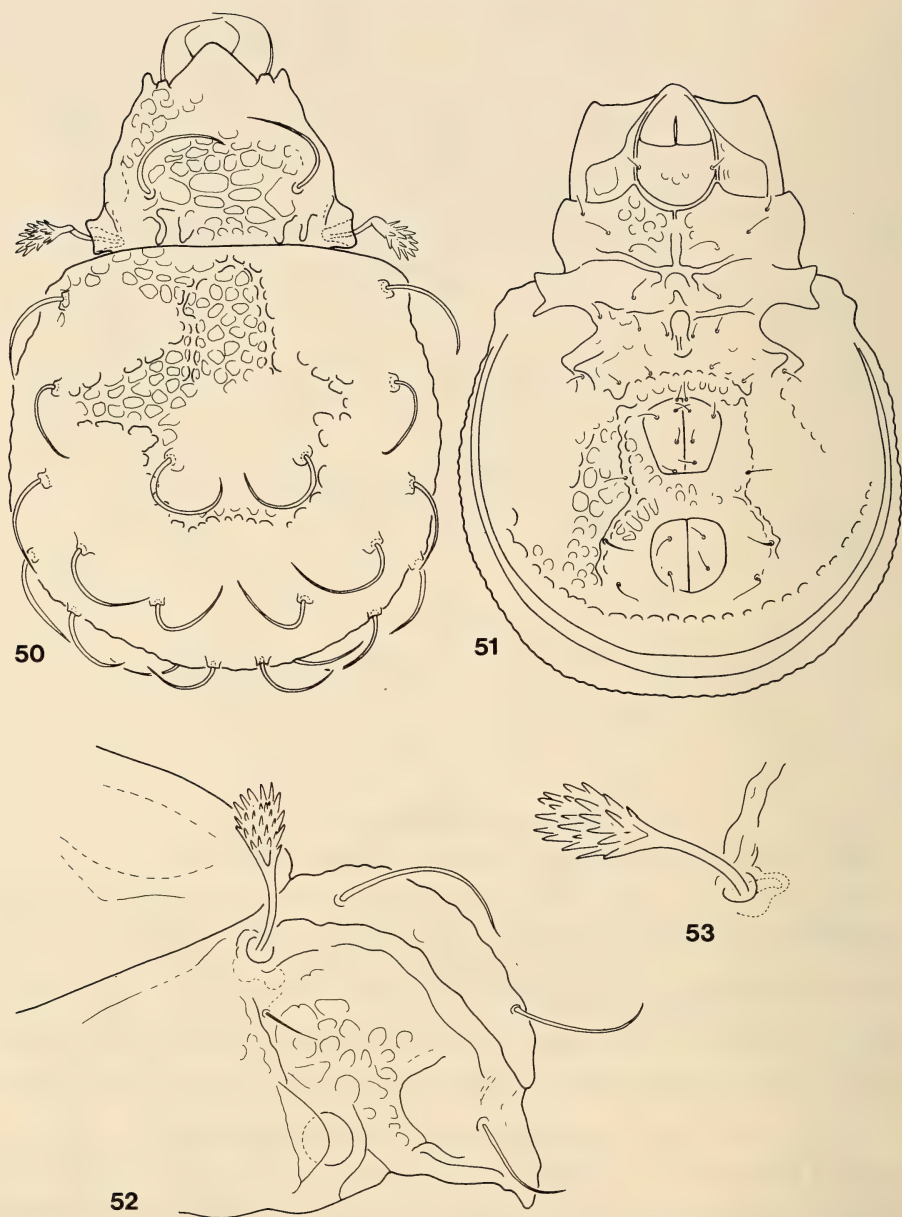
Measurements: Length: 247-297 μm , width: 184-218 μm .

Dorsal side (Fig. 50): Rostrum comparatively wide, with thin rostral setae arising marginally. Lamellae wide, with a small cuspis laterally. Lamellar setae long, originating on small tubercles, near the small cuspis. Lamellar and interlamellar surface fully polygonated as is interbothridial area. Interlamellar setae very long, longer than half distance between them. Sensillus (Fig. 53) with a round and well-spinulate head. Rostral part of prodorsum not, exobothridial part well foveolated (Fig. 52). Notogastral surface totally foveolate, with some crescents or deep depressions. All notogastral setae very long, curved, e.g. seta r_3 reaching to the insertion point of r_2 or seta ta to that of seta te .

Ventral side (Fig. 51): Epimeral and ventral surface polygonated. Apodemes hardly visible. A stronger chitinous crescent clearly framing the genital and anal openings. Epimeral setae simple, slightly longer than the genital ones. Aggenital and two pairs of adanal setae arising on chitinous crescents.

Material examined: Holotype: Sab-82/27; 13 paratypes: from the same sample. Holotype and 8 paratypes: MHNG; 5 paratypes (927-PO-83): HNHM.

Remarks: The new species stands very near to *Microtegeus reticulatus* Aoki, 1965 described from Thailand. However they are distinguished by the lengths of notogastral setae and by the shape of sensillus.



FIGS 50-53.

Microtegeus sabahnus sp. n. — 50: dorsal side; 51: ventral side; 52: prodorsum from lateral view; 53: sensillus.

Suctotegeus gen. nov.

Diagnosis: Family *Microtegeidae*. Habitus (Fig. 56) resembling *Microtegeus* Berlese, 1916. Prodorsum and lamellae elongated, strongly narrowed anteriorly. Labiogenal articulation of suctorial type, chelicerae peloptoid. Apodemes well developed, sternal apodeme present. Five pairs of genital setae arranged in a longitudinal row, one pair of aggenital, two pairs of adanal setae present. All legs monodactylous.

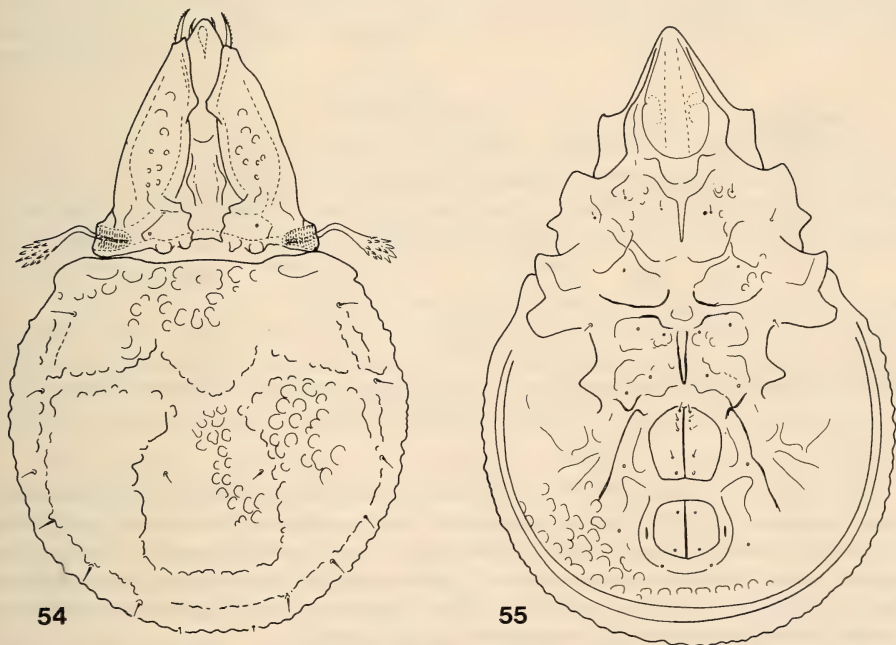
Type-species: *Suctotegeus tumescitus* sp. n.

Remarks. The new genus is characterized by the elongated prodorsum and first of all by the suctorial labiogenal articulation. The family *Microtegeidae* Balogh, 1972 has included so far only the type-genus with a normal, diarthric labiogenal articulation.

***Suctotegeus tumescitus* sp. n.**

Measurements: Length: 228-263 μm , width: 138-173 μm .

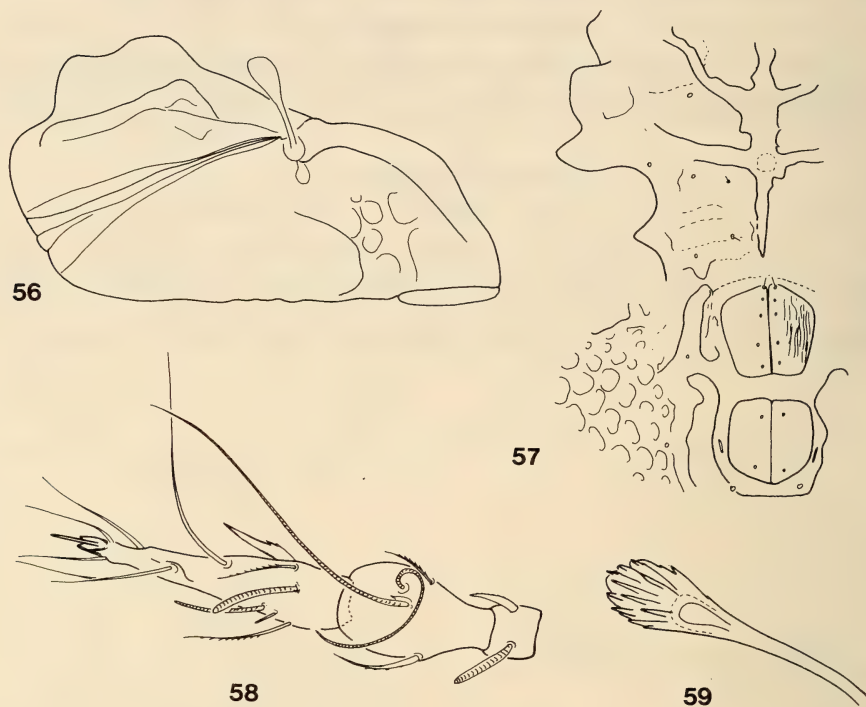
Dorsal side (Fig. 54): Rostrum protruding far from under lamellae, rostral setae very short, slightly dilated. Lamellae well separated from prodorsal surface, with a typical cuspis, bearing short, thick and barbed lamellar setae. Surface of lamellae ornamented by some large foveolae. Interlamellar setae minute, originating in



FIGS 54-55.

Suctotegeus tumescitus gen. n., sp. n. — 54: dorsal side; 55: ventral side.

interlamellar position. Between lamellae some rugae or laths visible, basally a transversal band with two pairs of tubercles present. Sensillus (Fig. 59) reclinate, with dilated and thorned head. Notogaster with deep hollows and — with the exception of the shoulders — ornamented by large foveolae. A very high protuberance in the middle of its posterior part. Notogastral setae spiniform, short, fine, hardly visible.



FIGS 56-59.

Suctotegeus tumescitus gen. n., sp. n. — 56: habitus from lateral view; 57: epimeral region; 58: leg I; 59: sensillus.

Ventral side (Fig. 55): All pedotecta well developed and strongly chitinized. Epimeral setae (Fig. 57) short or represented only by alveoli. Genital and anal plates framed by chitinous laths or ridges, similar ones also present in apoanal position. An opposite pair of tubercles on each side of genital opening. Ventral plate also with large foveolae. Surface of genital and anal plates with very fine sculpture consisting of longitudinal rugae. All setae in anogenital region minute.

Legs: Tarsus of leg I (Fig. 58) with a modified phylliform seta (*pl'*).

Material examined: Holotype: Sab-82/27; 15 paratypes: from the same sample; 1 paratype: Sab-82/41. Holotype and 10 paratypes: MHNG; 6 paratypes (928-PO-83): HHNM.

Remarks: HAMMER recently described the species *Microtegeus rimosus* Hammer, 1982 (*Suctotegeus rimosus* (Hammer, 1982) comb. nov.) from Bali, which evidently belongs to this genus. The new species is distinguished from it by the foveolate surface of the lamellae, the shorter sensillus and by the foveolate ventral plate.

***Microzetes tuberculatus* sp. n.**

Measurements: Length: 396-427 μm , width: 281-297 μm .

Dorsal side (Fig. 60): Lamellae very large, covering the greatest part of prodorsum. Lamellar setae thick, bean-pod-shaped, originating from ventral side of lamellae. Interlamellar setae minute arising from the inner surface of lamellae. Sensillus very long, filiform, reaching backwards. Notogaster partly covered with secretion tubercles. Pteromorphae small, margin and surface tuberculate. Notogastral setae simple. Rostrum wide, rostral setae originating on a large projection. Tutorium simple (Fig. 62). Pedotecta I with transversal rugae.

Ventral side (Fig. 61): Apodemes typical, epimeral setae short, thin and simple, as are setae of anogenital region.

Material examined: Holotype: Sab-82/41; 17 paratypes: from the same sample. Holotype and 10 paratypes: MHNG; 7 paratypes (929-PO-83): HNHN.

Remarks: The new species is well ranged into the genus *Microzetes* Berlese, 1913. It is distinguished from all other known species by the very characteristic sculpture and structure of the notogaster, the pedotecta, and by the shape of lamellae and lamellar setae.

***Furcoppia horakae* sp. n.**

Measurements: Length: 356-386 μm , width: 237-248 μm .

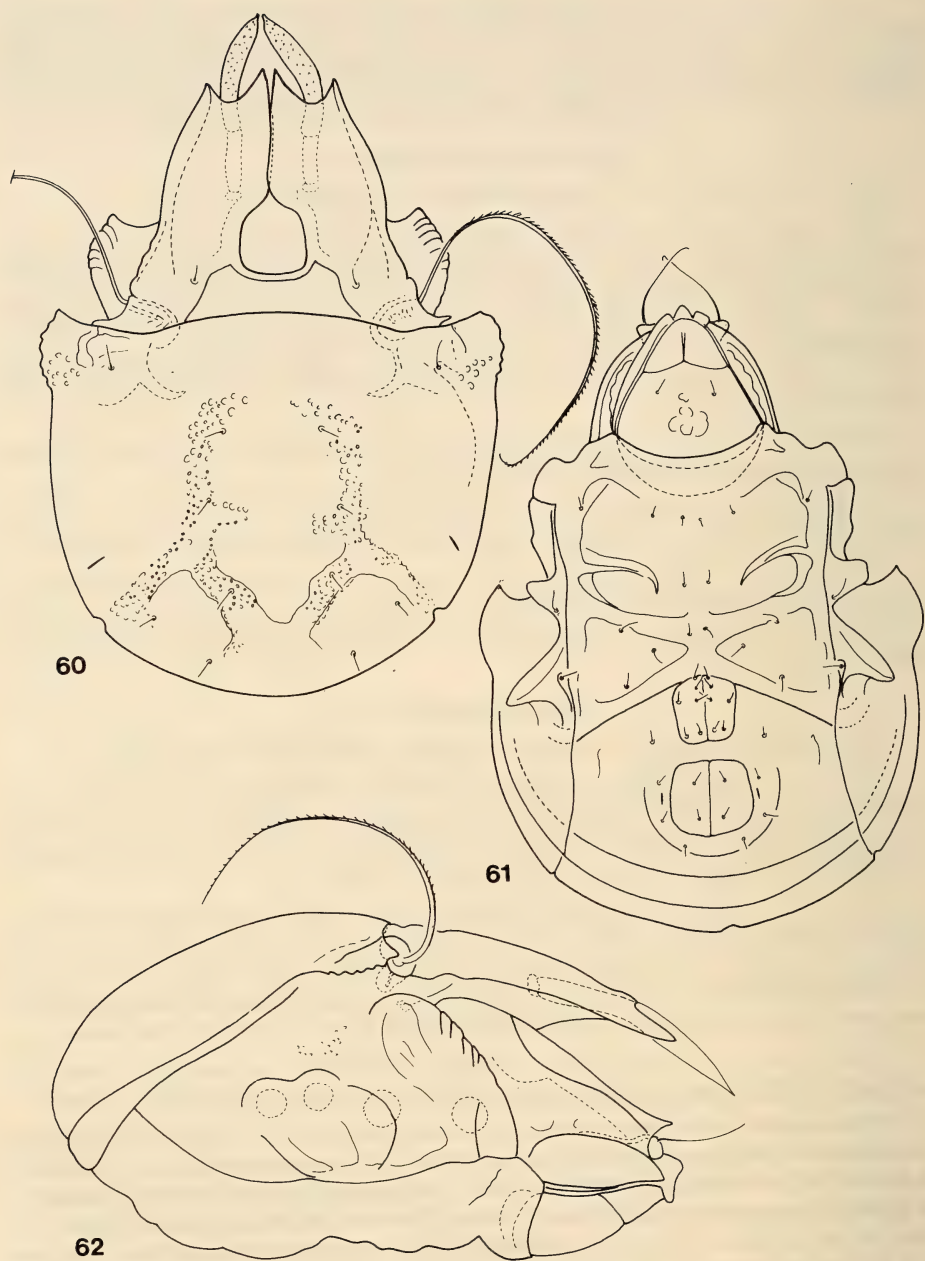
Dorsal side (Fig. 63): Rostrum divided by two deep and narrow incisions, tricuspidate. Rostral, lamellar and interlamellar setae as well as sensillus (Fig. 66) similar to those of the other species of this genus. Notogaster rounded, only slightly elongated. Ten pairs of notogastral setae, all minute, hardly visible.

Ventral side (Fig. 64): Apodemes well developed, sejugal apodeme reaching to genital plates, connected to each other very near to the genital margin (Fig. 65). Genital plates well framed by thick chitinous laths. No great differences among epimeral setae, all reaching forwards. Six pairs of genital setae, on the anterior margin of the plates only two pairs. Setae ad_3 arising in paraanal position, near to pori *iad* and far from setae ad_2 .

Material examined: Holotype: Sab-82/27; 10 paratypes: from the same sample. Holotype and 6 paratypes: MHNG; 4 paratypes (930-PO-83): HNHN.

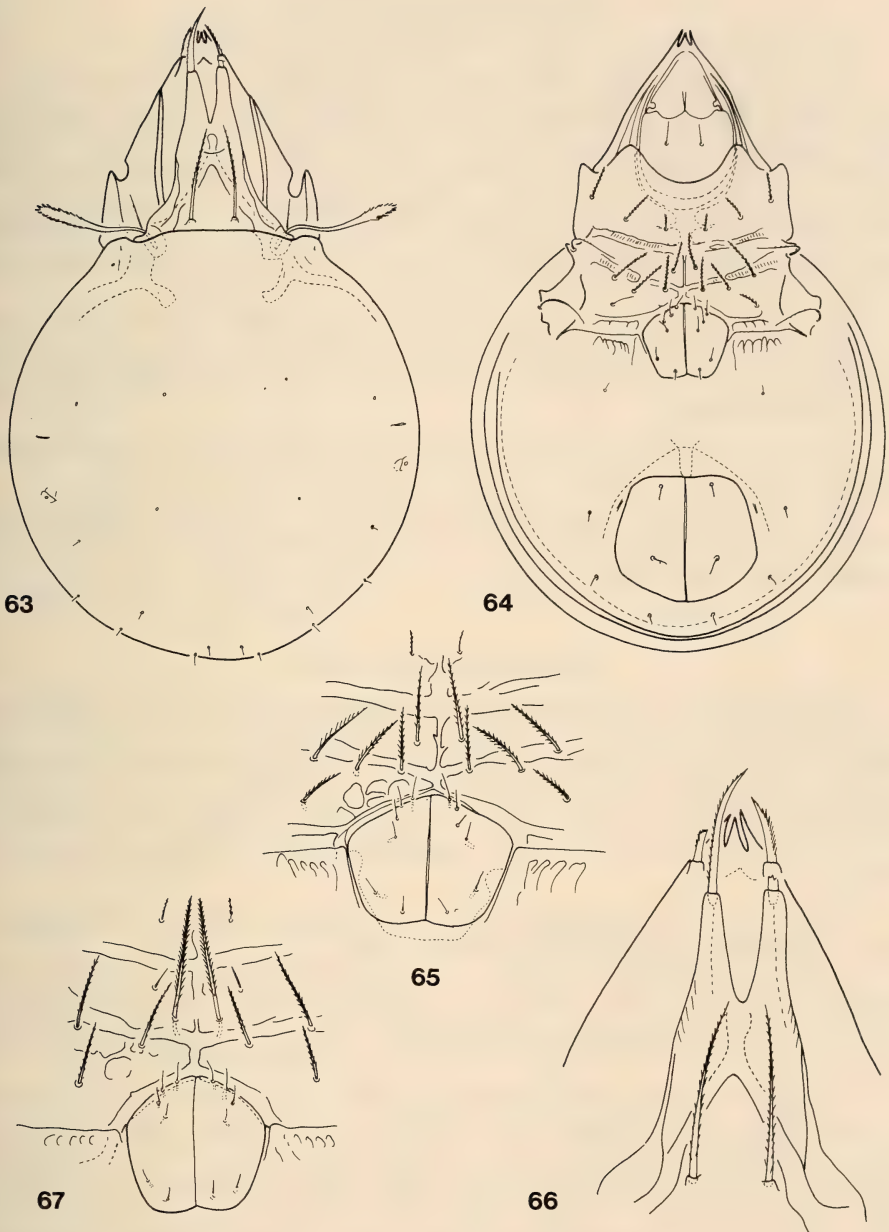
Remarks: The new species is well characterized by the epimeral setae. Some of the species of this genus have very long setae (*3a*) on the epimeral surface (*F. parva* Bal. et Mah., 1967; *F. cornuta* Hammer, 1970; *F. tricornuta* Mah., 1978) however, setae *3a* of the new species are not longer than *2a* or *3b*. The other difference between them is the form of the apodemes: the sternal apodeme between the sejugal apodeme and apodeme 3 is missing in the new species (Fig. 65), it is short in *F. cornuta* and slightly longer in *F. tricornuta* (Fig. 67). The position of the genital and adanal setae may also be a very good diagnostic character for these species.

I dedicate the new species to the well known lepidopterologist Mrs Dr. M. Horak (Zürich, now Canberra), companion of Dr. B. Hauser in this collecting trip.



FIGS 60-62.

Microzetes tuberculatus sp. n. — 60: dorsal side; 61: ventral side; 62: prodorsum from lateral view.



FIGS 63-67.

Furcoppia horakae sp. n. — 63: dorsal side; 64: ventral side; 65: epimeral region; 66: lamellae.

Furcoppia tricornuta Mahunka, 1978 — 67: epimeral region.

Congocepheus orientalis sp. n.

Measurements: Length: 480-580 μm ; width: 267-322 μm .

Dorsal side (Fig. 68): Rostral setae finely barbed, slightly smaller than serrated lamellar ones (Fig. 72). Interlamellar setae reaching outwards, arising on transversal laths. Lamellar surface ornamented by foveolae. Sensillus setiform, only slightly thickened, curved backwards. A deep hollow between prodorsum and notogaster present (Fig. 71), dorsosejugal suture not visible medially. Notogaster with large tubercles and laths, phylliform notogastral setae arising on them. Setae c_1 and c_2 arising immediately near to each other, both smaller than the other — except posteromarginal ones. Some foveolae also present in the middle of the posterior part of notogaster.

Ventral side (Fig. 69): Setae h of mentum phylliform but short, some setae [$1b$ (Fig. 70) $3b$, $3c$, $4b$, $4c$] also slightly widened, also phylliform, but long. Setae $1a$, $2a$, $3a$ simple and short. Genital and anal setae also slightly widened, adanal setae resembling the long epimeral ones.

Material examined: Holotype: Sab-82/27; 2 paratypes: from the same sample. Holotype and 1 paratype: MHNG; 1 paratype (931-PO-83): HHNM.

Remarks: The new species is the first record of *Congocepheus* Balogh, 1958 in the Oriental Region. It is distinguished from both known species by the shape of its notogastral and ventral setae.

Yoshiobodes Mahunka, 1986 *

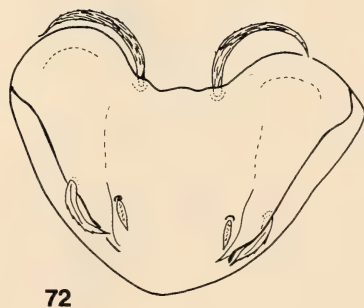
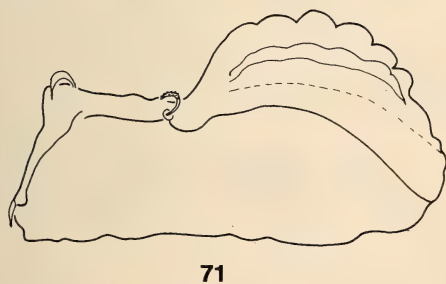
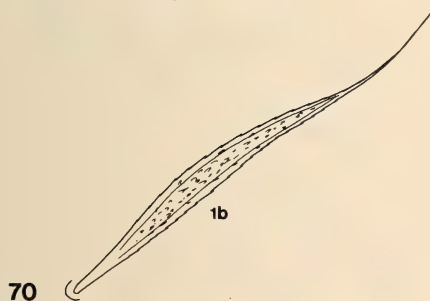
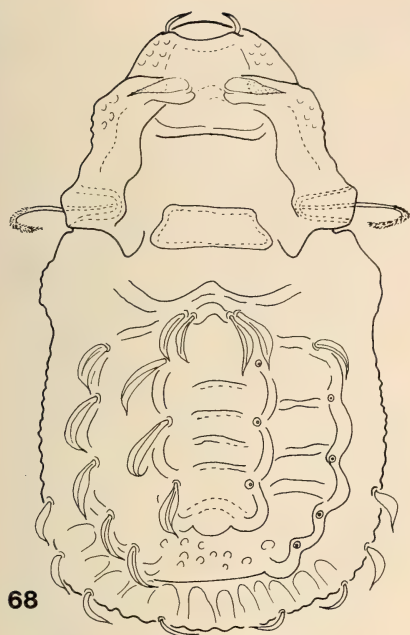
Diagnosis: Family *Carabodidae*. Lamellae long, continuing in prelamellae, translamella absent. A deep hollow in interlamellar position present. Interlamellar setae arising on the surface of lamellae. Sensillus long, with a spatulate head. Notogaster covered with tubercles. Fifteen pairs of phylliform notogastral setae arising in three longitudinal rows (4-5-6), setae c_2 and c_3 in a transversal row. Epimeral setal formula: 3-1-3-3. Four pairs of genital, one pair of aggenital, two pairs of anal and three pairs of adanal setae.

Type species: *Yoshiobodes irmayi* (Balogh et Mahunka, 1969) comb. nov. = *Carabodes irmayi* Balogh et Mahunka, 1969.

Other species: *Yoshiobodes aokii* sp. n., *Yoshiobodes arcuatus* sp. n., *Yoshiobodes nakatamari* (Aoki, 1973) comb. nov. = *Archegocepheus nakatamari* (Aoki, 1973) = *Austrocarabodes nakatamari* Aoki, 1973, *Yoshiobodes papuanus* (Balogh, 1970) stat. nov., comb. nov. = *Austrocarabodes humeratus papuanus* Balogh, 1970.

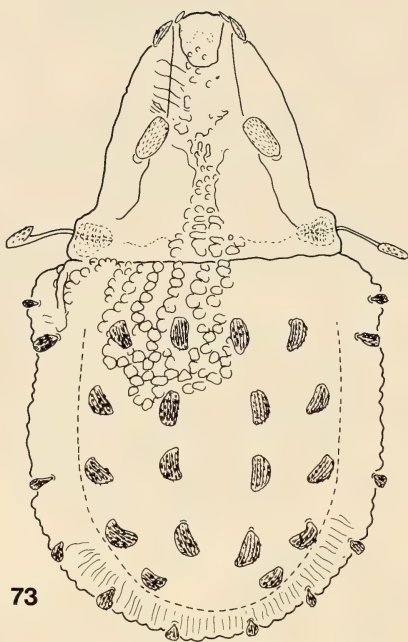
Remarks: The family *Carabodidae* includes only one genus having 15 pairs of notogastral setae: *Archegocepheus* Aoki, 1965 (type: *A. immadatei* Aoki, 1965). Later AOKI placed several species in this genus: *A. nakatamari* (Aoki, 1973), *A. humeratus* (Berlese, 1913) and *A. humeratus papuanus* (Balogh, 1970). In connection with the newly collected species in Sabah I revised the type of *Carabodes irmayi* Balogh et Mahunka, 1969 (Figs 81-82) and *Austrocarabodes humeratus papuanus* Balogh, 1970 (Figs 79-80) and found that fifteenth pair of notogastral setae were overlooked, so both species are closely related to each other and to *Archegocepheus nakatamari*. However, the type of the genus

* Only a preliminary description was given (MAHUNKA 1986).



FIGS 68-72.

Congocephus orientalis sp. n. — 68: dorsal side; 69: ventral side; 70: seta 1b;
71: habitus from lateral view; 72: prodorsum from anterior view.



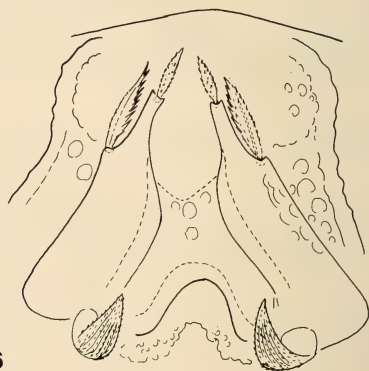
73



74



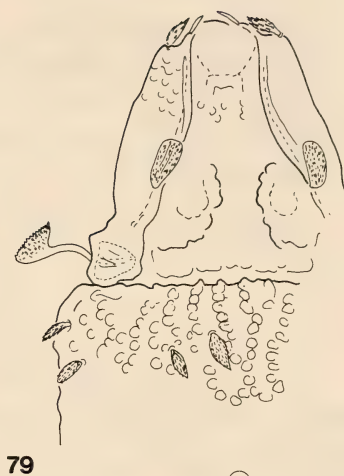
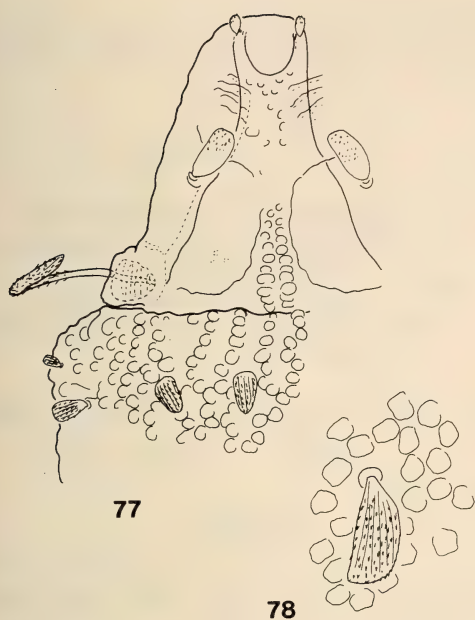
75



76

FIGS 73-76.

Yoshiobodes aokii sp. n. — 73: dorsal side; 74: ventral side; 75: sensillus;
76: prodorsum from anterior view.



FIGS 77-82.

Yoshiobodes aokii sp. n. — 77: prodorsum; 78: seta d_1 .

Yoshiobodes papuanus (Balogh, 1970) — 79: prodorsum; 80: seta d_1 .

Yoshiobodes irmayi (Balogh et Mahunka, 1969) — 81: prodorsum; 82: seta d_1 .

Archegocepheus is distinguishable from these by some very important characters. On this ground I am erecting a new genus. The genera *Archegocepheus* and *Yoshiobodes* may be distinguished by the following characters:

Archegocepheus

1. Interlamellar surface convex.
2. Interlamellar setae arising in interlamellar position.
3. Sensillus setiform.
4. Setae c_2 , c_3 and $1a$ arising nearly in a longitudinal row.

Yoshiobodes

1. Interlamellar surface concave.
2. Interlamellar setae arising on the surface of lamellae.
3. Sensillus with spatulate head.
4. Setae c_3 and $1a$ arising far laterally from setae c_2 .

I dedicate the new genus to Prof. Dr. R. Yoshii (Kyoto), renown collembologist, who helped much in the realisation of this collecting trip.

***Yoshiobodes aokii* sp. n.**

Measurements: Length: 306-342 μm , width: 173-198 μm .

Dorsal side (Fig. 73): Lamellae thin, gradually narrowing anteriorly, continuing in prelamellae (Fig. 76), lamellar and rostral setae arising on them. Both pairs phylliform with ciliate or serrate margin. Interlamellar surface (Fig. 77) partly foveolate (anteriorly), partly smooth (laterally), and in the hollow a row of foveolae visible. Lamellar surface with some rugae. Interlamellar setae large, phylliform, finely barbed. Sensillus (Fig. 75) long, with a spatuliform and spinulose head.

Notogastral surface with large tubercles, partly widened in polygonal reticulation. All notogastral setae (Fig. 78) dilated, with striated and barbed surface. Median setae much greater than lateral ones, setae c_3 the smallest, hardly visible.

Ventral side (Fig. 74): Epimeral surface with foveolae, anogenital surface ornamented with tubercles. All setae — excepting adanal ones — very small or minute, adanal setae dilated, phylliform, like notogastral ones.

Material examined: Holotype: Sab-82/34; 40 paratypes: from the same sample; 3 paratypes: Sab-82/41. Holotype and 27 paratypes: MHNG; 16 paratypes (932-PO-83): HNHN.

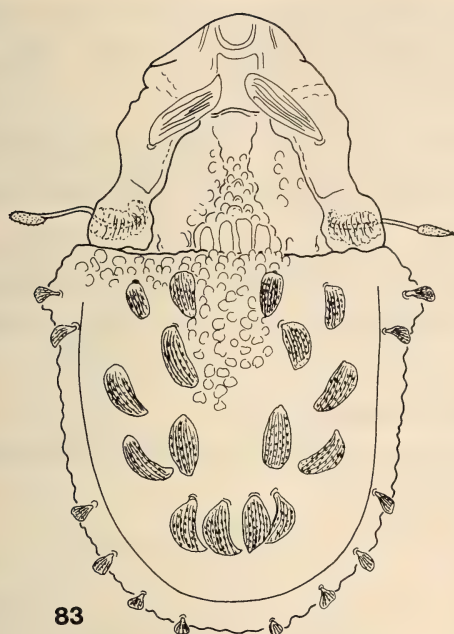
Remarks: All four known oriental species stand very near to one another. However, the interlamellar region of *nakatamari* is much broader than in the other species. The latter are distinguished from one another by the shape of prodorsal surface, the form of tubercles and by the form of the notogastral setae as shown in Figs 77-82.

I dedicate the new species to Dr. J. Aoki, the excellent Oribatidologist of the Oriental Region.

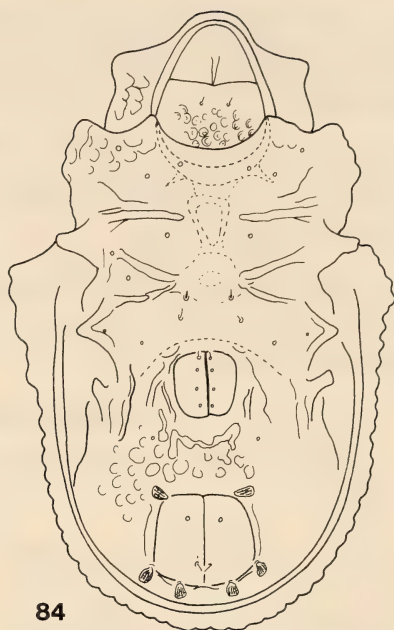
***Yoshiobodes arcuatus* sp. n.**

Measurements: Length: 272-321 μm , width: 178-203 μm .

Dorsal side (Fig. 83): Lamellae long, continuing in small prelamellae. Rostral setae phylliform, lamellar setae thin, setiform. Rostrum ornamented by ring-like foveolae (Fig. 86). Interlamellar setae very large, being the largest setae of the body. Sensillus (Fig. 85) spatulate and spiculate. Interlamellar surface foveolate medially, with



83



84



85



86

FIGS 83-86.

Yoshiobodes arcuatus sp. n. — 83: dorsal side; 84: ventral side;
85: sensillus; 86: prodorsum from anterior view.

some arches basally. Notogaster gradually narrowed to posterior part, lateral margin flat, median part strongly swelling out. Fourteen pairs of phylliform notogastral setae, in typical position Setae of lateral margin much smaller than median ones, all finely striated and barbed.

V e n t r a l s i d e (Fig. 84): Epimeral surface with some large foveolae laterally, anogenital surface with some rugae and tubercles. All setae — excepting the adanal ones — simple, short and hardly discernible. Adanal setae phylliform, much smaller than notogastral ones.

M a t e r i a l e x a m i n e d: Holotype: Sab-82/41; 18 paratypes: from the same sample. Holotype and 11 paratypes: MHNG; 7 paratypes (933-PO-83): HNHN.

R e m a r k s: The new species is well distinguishable by the sculpture of the interlamellar region.

***Arcoppia bidentata sabahensis* ssp. n.**

This form stands very near to the nominate subspecies, however, it is distinguished from the latter by the following features (Figs 87-90):

bidentata bidentata Hammer, 1980

1. Notogastral setae short, setae *ti* only half as long as distance between setae *ti* and *ms*.
2. Setae r_3 only one third, setae r_2 only half as long as setae *te*.
3. Prodorsal costula weaker in the middle part than laterally.
4. Setae g_6 arising nearer to the inner margin of genital plates than to g_5 .
5. Setae ad_3 originating before pori *iad*.

bidentata sabahensis

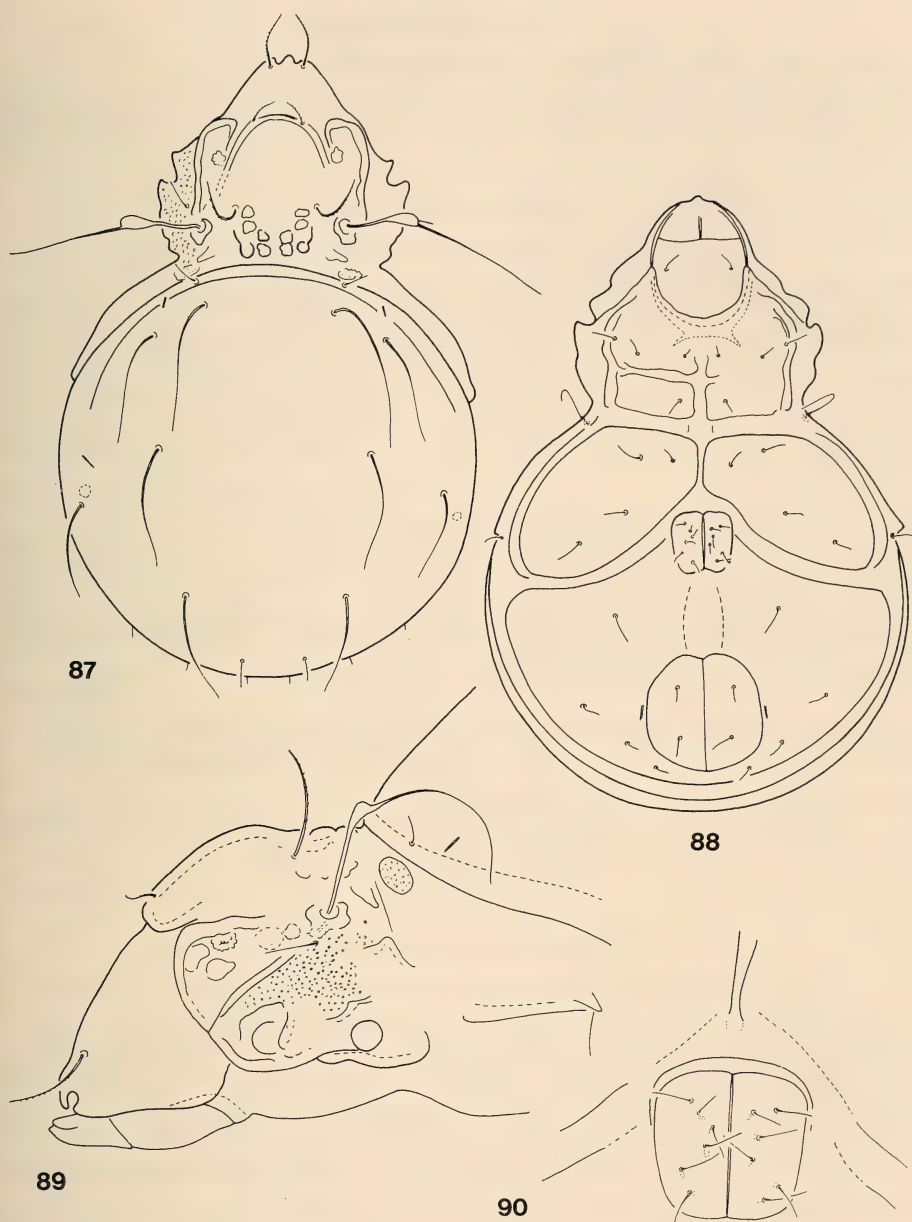
1. Notogastral setae long, setae *ti* nearly as long as distance between setae *ti* and *ms*.
2. Setae *te*, *ms*, r_2 and r_3 nearly equal in length.
3. Prodorsal costula equally thick in the middle as laterally.
4. Setae g_6 arising farther from the inner margin of genital plates than from g_5 .
5. Setae ad_3 originating beside pori *iad*.

M e a s u r e m e n t s: Length: 518-543 μ m, width: 324-356 μ m.

M a t e r i a l e x a m i n e d: Holotype: Sab-82/27; 3 paratypes: from the same sample. Holotype and 2 paratypes: MHNG; 1 paratype (934-PO-83): HNHN.

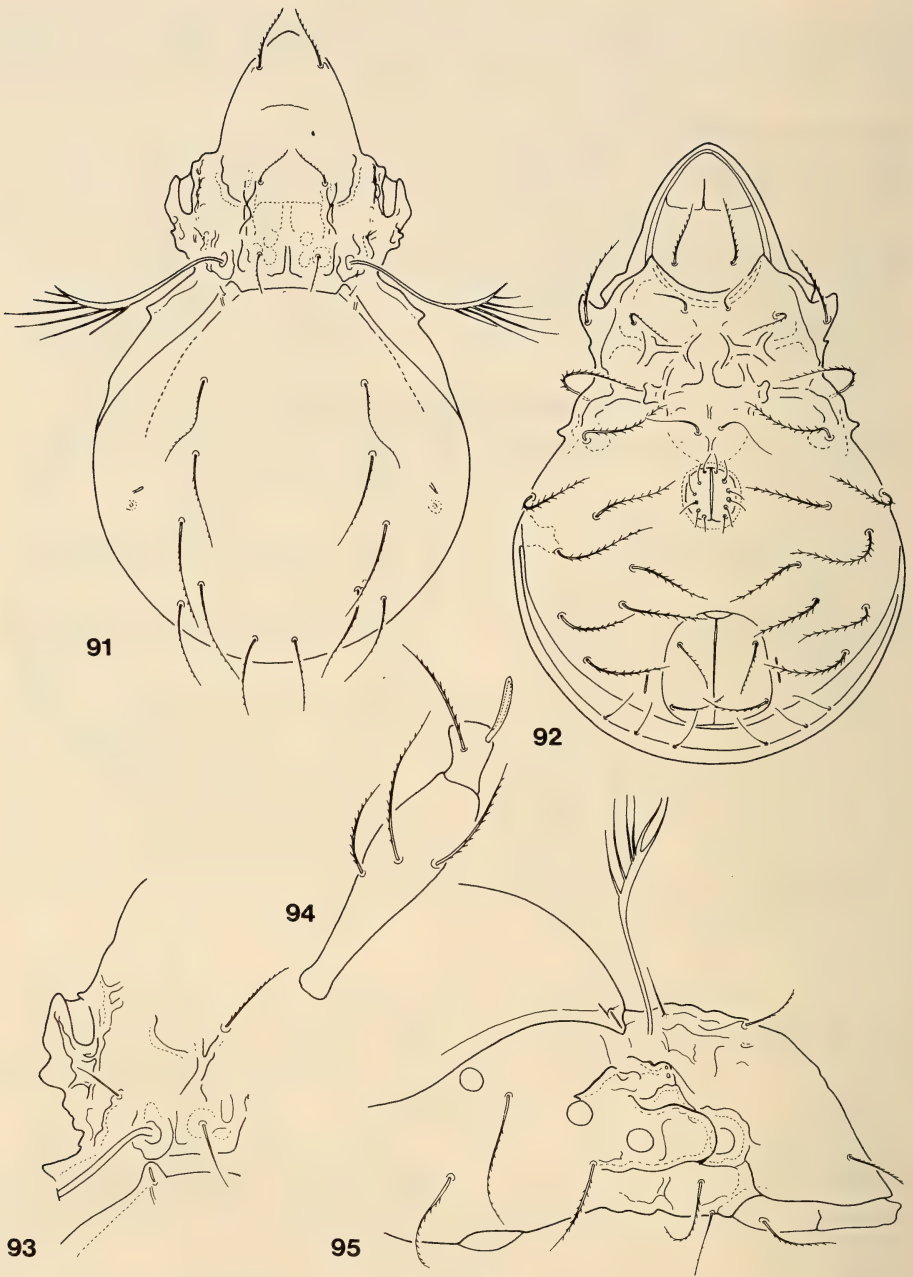
***Interoppia* gen. n.**

D i a g n o s i s: Family *Oppiidae*. Rostrum rounded, without incision. Prodorsum strongly chitinized, costulae present. Lamellar setae originating nearer to interlamellar than to rostral ones. Sensillus very long, pectinate. Notogaster with one pair of tubercles on shoulder, crista absent. Setae *ta* present, ten pairs of notogastral setae, *ta*, *te*, *ti*, *ms*, r_2 in a longitudinal row. Apodemes partly reduced, *ap. 3* and *4* absent. Median part of epimeral region slightly concave, this part well framed by chitinous laths. Distance between legs III and IV great, pedotecta III present, IV absent. Six pairs of long genital setae. All three pairs of adanal setae and also pori *iad* in apoanal position. Legs very long and thin.



FIGS 87-90.

Arcoppia bidentata sabahensis ssp. n. — 87: dorsal side; 88: ventral side;
89: prodorsum from lateral view; 90: genital plates.



FIGS 91-95.

Interoppia mirabilis gen. n., sp. n. — 91: dorsal side; 92: ventral side; 93: exobothridial region; 94: leg III; 95: prodorsum from lateral view.

Type-species: *Interoppia mirabilis* sp. n.

Remarks: The new genus stands near to *Hammerella* Balogh, 1983, however, the new taxon has no apodema III and IV, and the shape of ventral plate is highly different. My opinion is that the *Arcoppia*-group (*Arcoppiinae* Balogh, 1983) should not be fused with these two genera.

***Interoppia mirabilis* sp. n.**

Measurements: Length: 396-441 μm , width: 228-257 μm .

Dorsal side (Fig. 91): Rostral setae arising laterally, well ciliate, longer than lamellar or interlamellar ones (Fig. 95). The latter are the smallest, and not ciliate. Sensillus very long, pectinate, with 6-8 branches. Prodorsal surface with well-chitinated costulae and some rugae, laths or depressions in the interlamellar and exobothridial region (Fig. 93). Latter without granulation. Notogaster high, nearly round, with a pair of lateral tubercles. Setae *ta* originating on them, pori *ia* immediately next to them. Setae *ta* short but staff-shaped, setae *te*, *ti*, *ms*, *r*₁-*r*₃ curved, equal in length, well ciliate; setae *ps*₁-*ps*₃ straight and shorter than the preceding ones.

Ventral side (Fig. 92): Epimeral setae — excepting *1a*, *2a* and *3a* — very long, with long cilia, as are setae *h* on mentum. Sternal apodeme not developed. Genital plates small, much smaller than anal ones. Legs IV originating far from legs III, therefore, setae *4a-4c* in aggenital or postgenital position. *4b* arising scarcely before aggenital ones. Adanal and aggenital setae similar to epimeral ones. Setae *ad*₃ arising much nearer to anal opening than setae *ad*₂. Pori *iad* long. Anal setae originating on the outer part of anal plates.

Legs: All legs very long, the joints are thin. Tibia without tubercles. Solenidium δ_1 of leg III (Fig. 94) short, sausage-shaped.

Material examined: Holotype: Sab-82/27; 8 paratypes: from the same sample. Holotype and 5 paratypes: MHNG; 3 paratypes (935-PO-83): HHNM.

Remarks: On the ground of the generic diagnosis the new species differs from all related taxa.

***Pulchroppia burckhardti* sp. n.**

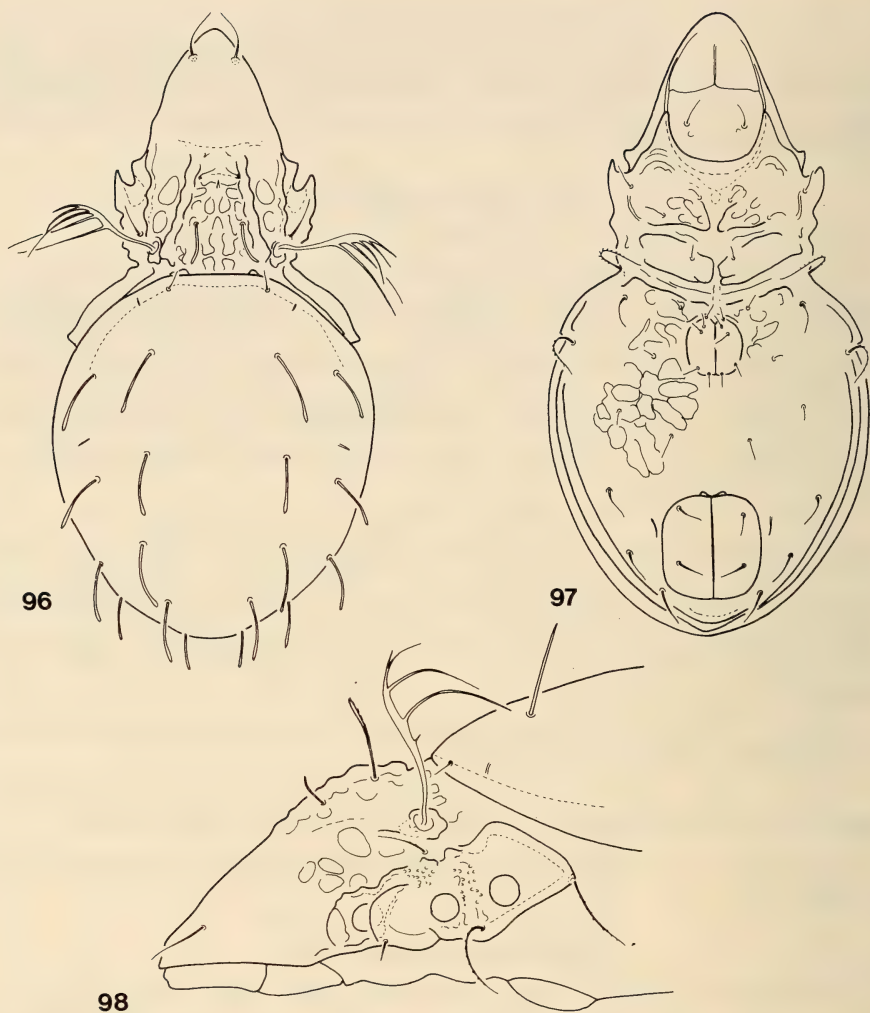
Measurements: Length: 295-475 μm ; width: 198-248 μm .

Dorsal side (Fig. 96): Rostrum rounded, rostral setae normal. Surface of prodorsum well chitinated, costulae present. Interbothridial region ornamented with some rugae, tubercles and chitinous laths. Interlamellar setae much longer than lamellar ones, slightly dilated proximally. Sensillus pectinate bearing 5-6 branches. Exobothridial region (Fig. 98) also with tubercles and other chitinous structures. Ten pairs of notogastral setae, setae *ta* simple, all others short, stout and dilated proximally.

Ventral side (Fig. 97): Epimeral and ventral sculptures and structures similar to those of the type of the genus. Epimeral setae — excepting *3c* and *4c* — short. Five pairs of simple genital setae. All three pairs of adanal setae in paraanal position.

Material examined: Holotype: Sab-82/27; 17 paratypes: from the same sample. Holotype and 9 paratypes: MHNG; 8 paratypes (936-PO-83): HHNM.

Remarks: On the ground of the missing apodemes 3 and 4, the typical sculpture of the ventral side the new species is well ranged in the genus *Pulchroppia* Ham-



FIGS 96-98.

Pulchroppia burckhardti sp. n. — 96: dorsal side; 97: ventral side; 98: prodorsum from lateral view.

mer, 1980, however, it has well developed costulae on the notogaster and its notogastral setae are dilated proximally.

I dedicate the new species to the well known psyllidologist Dr. D. Burckhardt (Zürich, now Geneva), companion of Dr. B. Hauser in this collecting trip.

***Oxymerus hauserorum* sp. n.**

Measurements: Length: 306-337 μm , width: 163-178 μm .

Dorsal side (Fig. 99): Rostrum elongated, conical. Rostral setae phylliform, dilated, originating near to rostrum (Fig. 102). Lamellar setae long, directed outwards. Interlamellar and exobothridial setae short. Sensillus (Fig. 101) gradually thickened anteriorly, with a serrated hyaline margin, directed outwards and backwards. Anterior notogastral split very broad, ending at the insertion points of seta *te*. Seta *ta* very short, hardly visible, setae *te* and *ti* flagellate, much longer than the other setae of notogaster, setae of the posterior margin short.

Ventral side (Fig. 100): Rostral region with two thin incisions laterally. Epimeral region resembling that of the other species of this genus, but epimeral setae very different. Setae *1a*, *1c*, and *2a* short but dilated, nearly phylliform, *1a* and *1b* originating very near to each other. Setae *1b* longer but stout. Setae *3a-3b*, *4a-4c* very long, directed forwards, setae *3b* reaching to the insertion points of setae *1a*. No seta on epimere 3. Epimeral setal formula: 3-1-0-5. Apparent setae *4a-b-c* standing very near to each other and very near to genital opening. Six pairs of genital setae present, g_6 longer and thicker than the others. Aggenital, anal and adanal setae short and simple. Setae ad_3 in preanal, pori *iad* and setae ad_2 in paraanal position, ad_1 missing.

Material examined: Holotype: Sab-82/41; 5 paratypes: from the same sample; 5 paratypes: Sab-82/5-II. Holotype and 6 paratypes: MHNG; 4 paratypes (937-PO-83): HHNM.

Remarks: The new species is well distinguished from the other species of *Oxymerus* Aoki, 1965 by the very wide notogastral split, the long and forward directed epimeral setae and by the origin of setae ad_3 .

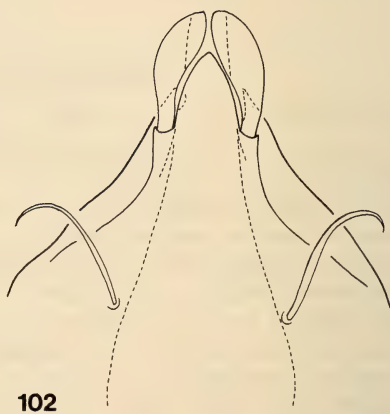
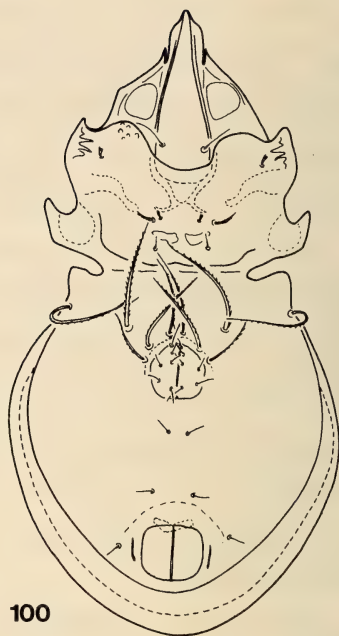
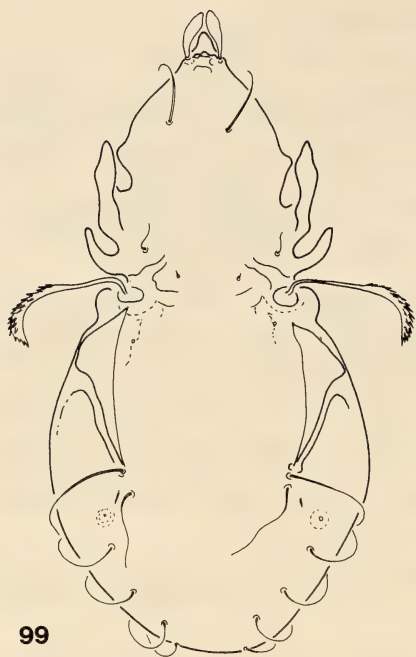
I dedicate the new species to my friends, the family Hauser.

***Machadobelba spathulifer* sp. n.**

Measurements: Length: 321-347 μm , width: 168-184 μm .

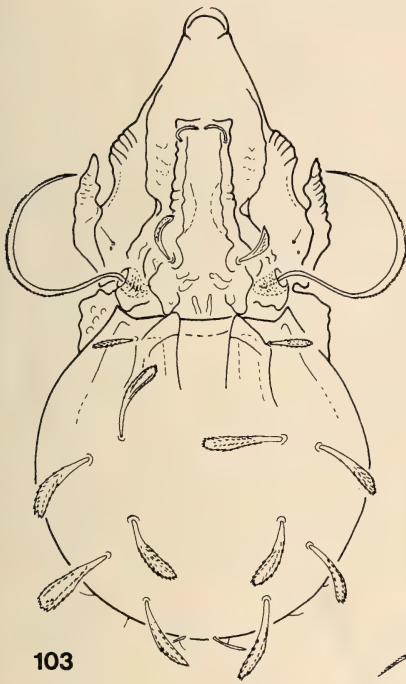
Dorsal side (Fig. 103): Rostral setae simple, lamellar setae slightly, interlamellar setae strongly dilated, latter ones spathulate, both pairs with serrated margin and finely ciliate. Lamellae well developed, but comparatively short, ending near to the insertion of lamellar setae and having a complicated structure in their middle part. Pro-dorsal margin behind rostrum with some transversal edges, pedotecta I with a serrated and divided border dorsally, and a polygonated surface laterally (Fig. 105). Both pairs of pro-dorsal tubercles large, well chitinized. Sensillus very long, simple, directed forwards. Median and lateral tubercles of notogaster continuing in long keels, nearly of equal size, but median ones wider. Ten pairs of notogastral setae, of different lengths, all spathulated, their surface ciliate, excepting r_1 , ps_2 , ps_1 , ps_3 , setae *ta* much smaller than the others.

Ventral side (Fig. 104): Strongly chitinized, epimeral borders well dilated. Epimeral setal formula: 3-1-3-3. All setae simple, but finely barbed. Beside genital opening one pair of chitinous ridge each ending in a rounded tooth anteriorly. They frame the genital opening. Six pairs of genital, one pair of aggenital setae, all shorter than adanal and anal ones. On the ventral plate of males a pair of porus fields present, absent in females.



FIGS 99-102.

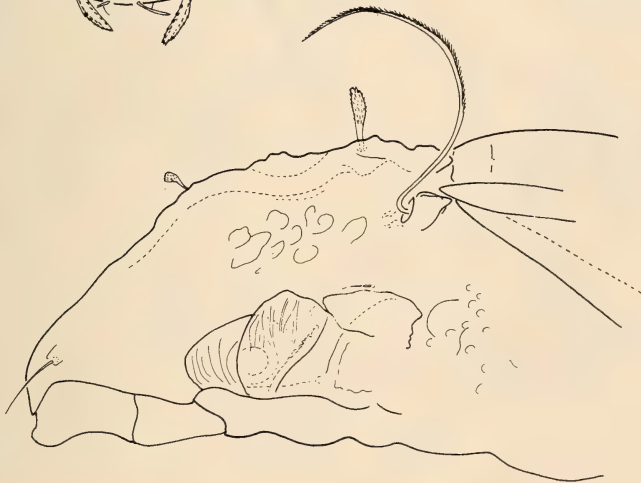
Oxyamerus hauserorum sp. n. — 99: dorsal side; 100: ventral side;
101: sensillus and the lateral part of notogaster; 102: rostrum.



103



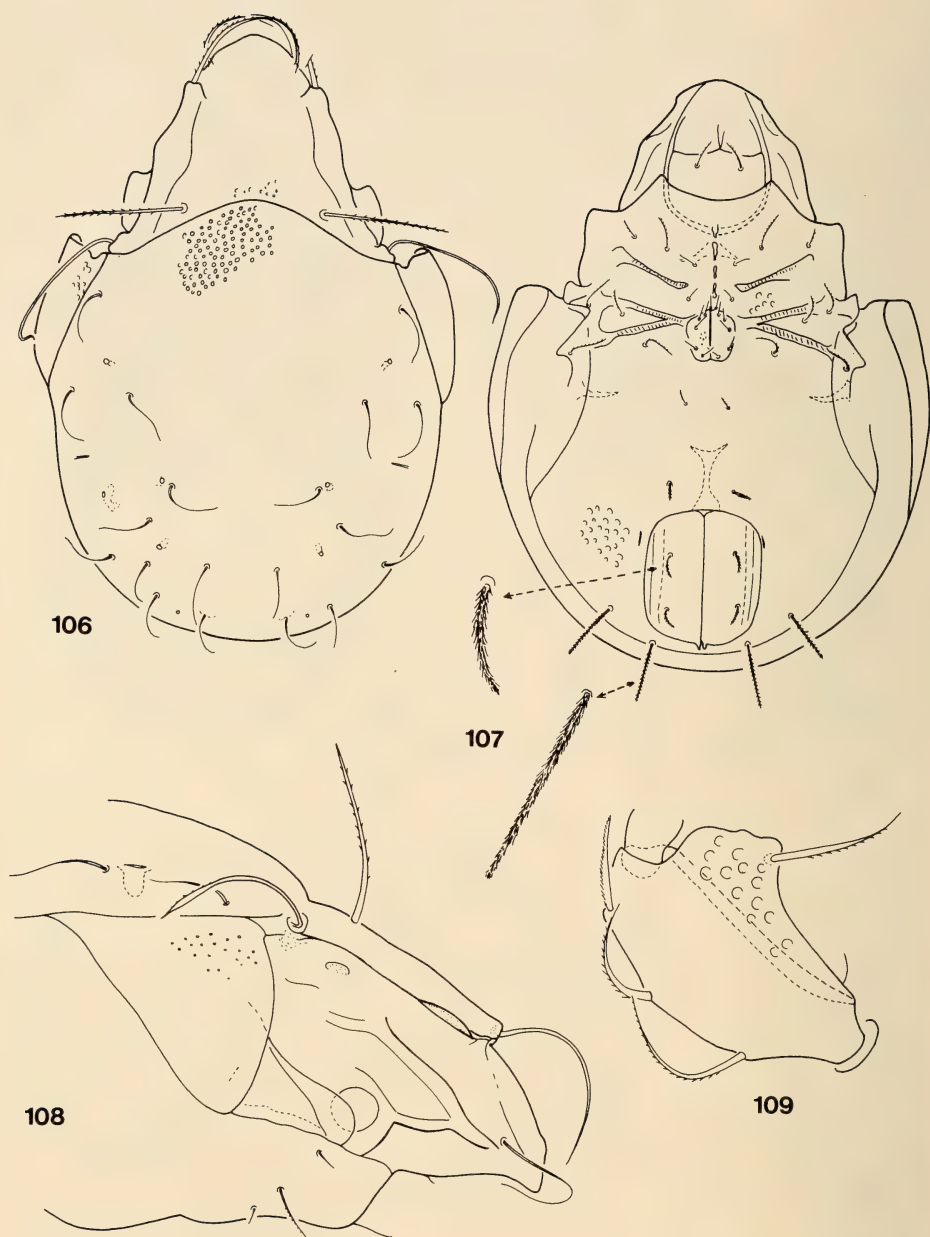
104



105

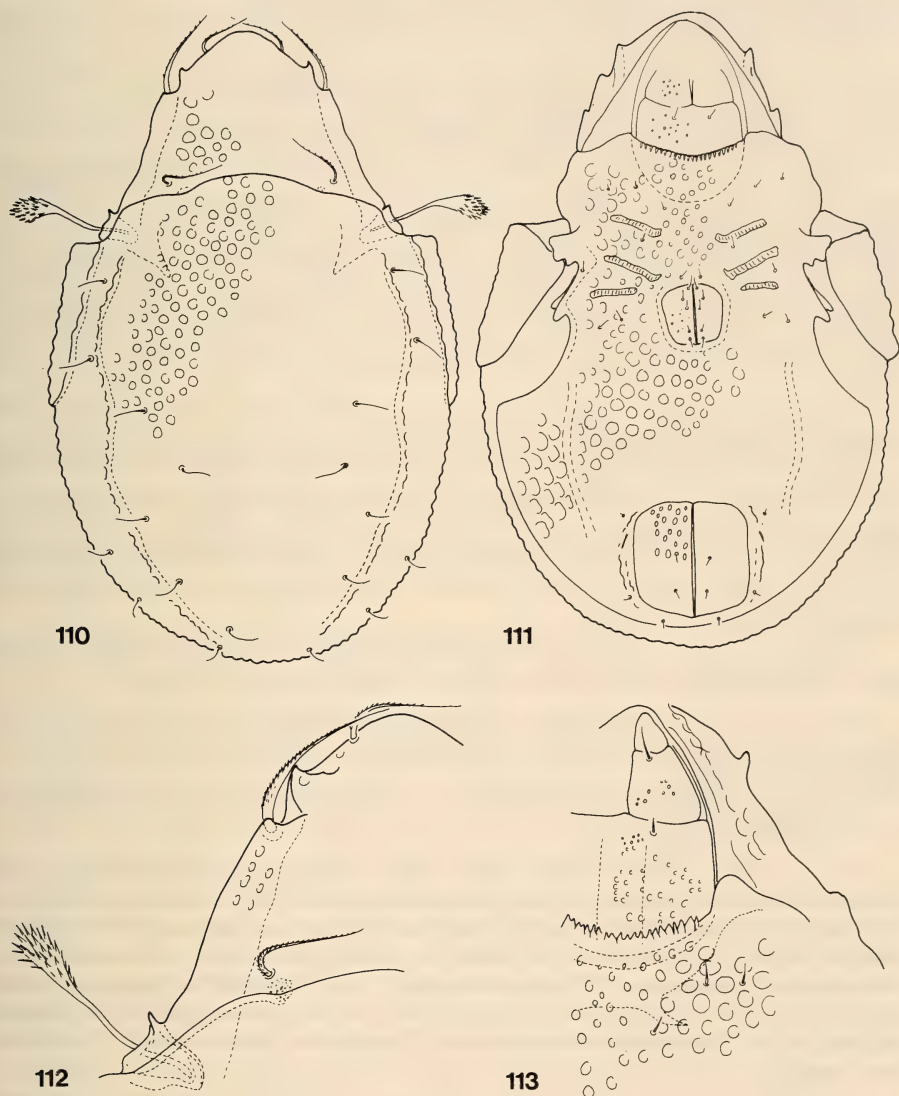
FIGS 103-105.

Machadobelba spathulifer sp. n. — 103: dorsal side; 104: ventral side;
105: prodorsum from lateral view.



FIGS 106-109.

Nixozetes (Philippizetes) corpusrarosae sp. n. — 106: dorsal side; 107: ventral side;
108: prodorsum from lateral view; 109: femur of leg II.



FIGS 110-113.

Rostrozetes nagaii sp. n. — 110: dorsal side; 111: ventral side;
112: lateral part of prodorsum; 113: mentum.

Material examined: Holotype Sab-82/41; 17 paratypes: from the same sample. Holotype and 10 paratypes: MHNG; 7 paratypes (938-PO-83): HNHM.

Remarks: The new species is distinguished from all the species of the genus *Machadobelba* Balogh, 1958 by the spatulate notogastral setae.

***Nixozetes (Philippizetes) corpusrarosae* sp. n.**

Measurements: Length: 664-786 μm , width: 461-550 μm .

Dorsal side (Fig. 106): Rostrum widely rounded, but narrowing at rostral setae. Lamellar apex free, lamellar seta arising on it. Translamella absent. Rostral and lamellar setae strongly curved inwards, very finely ciliate. Interlamellar setae straight, with longer cilia. Sensillus directed backwards, with slightly dilated, fusiform head (Fig. 108). Anterior and middle parts of prodorsum smooth, only basal part with some small foveolae. Notogastral surface well ornamented by large foveolae, pteromorphae also foveolate, but their distal end smooth. Ten pairs of curved, comparatively long notogastral setae, four pairs of small sacculi present.

Ventral side (Fig. 107): Sternal apodeme partly divided, sejugal and apodemes 3 connected medially. Epimeral setal formula: 3-1-3-2. Setae *1b* much longer than *1a* and *1c*. Surface of epimeres anteriorly nearly smooth, posteriorly and laterally with large irregular foveolae. Ornamentation of ventral plate similar to that of notogaster, genital plates bearing minute spots. Five pairs of simple genital, one pair of ciliate aggenital, two pairs of barbed anal and three pairs of also barbed adanal setae present. One pair of adanal setae in preanal, two pairs of much longer and straight adanal setae in post — or paraanal position.

Legs: All legs with three claws in heterodactylous formation. Femur of leg II with a large, peculiarly shaped (Fig. 109) edge, absent from the other legs.

Material examined: Holotype: Sab-82/27; 13 paratypes: from the same sample; 4 paratypes: Sab-82/34. Holotype and 11 paratypes: MHNG; 6 paratypes (939-PO-83); HNHM.

I dedicate the new species to Mrs Dr. L. A. Corpus-Raros, the excellent explorer of the Philippine Oribatids.

Remarks: Recently three new closely related genera or subgenera were established from the Oriental Region: *Nixozetes* Mahunka, 1977, *Sundazetes* Hammer, 1979 and *Philippizetes* Corpus-Raros, 1980. In my opinion *Sundazetes* and *Nixozetes* are identical therefore *Sundazetes* is the junior synonym of *Nixozetes* *. The separation of *Philippizetes* as a subgenus of *Nixozetes* is correct. The new species is well ranged in the genus *Nixozetes* (*Philippizetes*). It is distinguished from the known taxa by the different sculpture of the prodorsum and the notogaster, the shape of sensillus and by the missing translamella.

* *Nixozetes* Mahunka, 1977 = *Sundazetes* Hammer, 1979 **syn. n.**

Rostrozetes nagaii sp. n.

Measurements: Length: 277-297 μm , width: 158-198 μm .

Dorsal side (Fig. 110): Rostral part of prodorsum with one pair of sharp spurs laterally. Lamellae not well separated by their inner side from prodorsal surface, their cuspis covers the insertion point of lamellar setae (Fig. 112). Rostral, lamellar and interlamellar setae slightly thickened, well barbed. Bothridium with strongly protruding spines on its anterior margin. Sensillus with a very long, curved peduncle, its head thick, partly spinose. Prodorsal and notogastral surface ornamented with large foveolae. Middle part of notogaster framed with a characteristic carina. All ten pairs of notogastral setae fine and simple.

Ventral side (Fig. 111): Mentotectum serrated, resembling a crown or diadem. Mentum (Fig. 113) and genae irregularly foveolate, surface of epimeres with large foveolae of various sizes being smaller medially and larger marginally. All epimeral setae short, hardly visible. Foveolae on genital plates minute, on anal plates larger. Five pairs of genital, two pairs of anal and three pairs of adanal setae present, setae ad_1 in postanal, setae ad_2 and ad_3 in paraanal position, both latter pairs very near to the anal opening. Aggenital setae missing.

Material examined: Holotype: Sab-82/27; 20 paratypes: from the same sample. Holotype and 12 paratypes: MHNG; 8 paratypes (940-PO-83) HHNM.

Remarks: The new species is well distinguished from all other related species by the sharp spines of the bothridium. It belong to the "*foveolatus*" group, however, the other species have much shorter peduncle of the sensillus and the aggenital setae are always present.

I dedicate the new species to the coleopterologist Mr. S. Nagai (Tokyo) who helped very much Dr. B. Hauser in collecting this material.

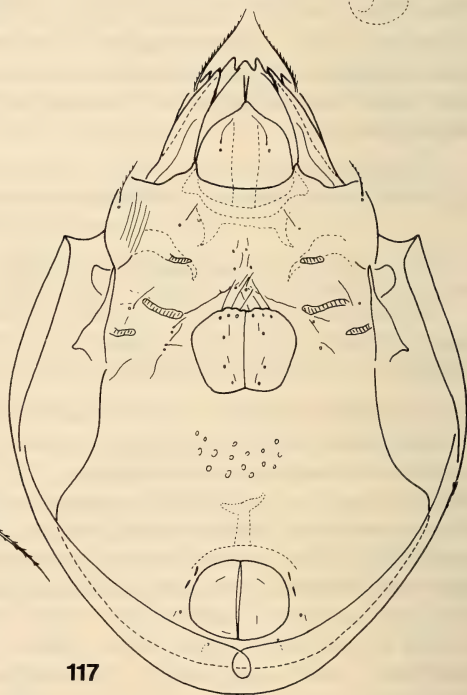
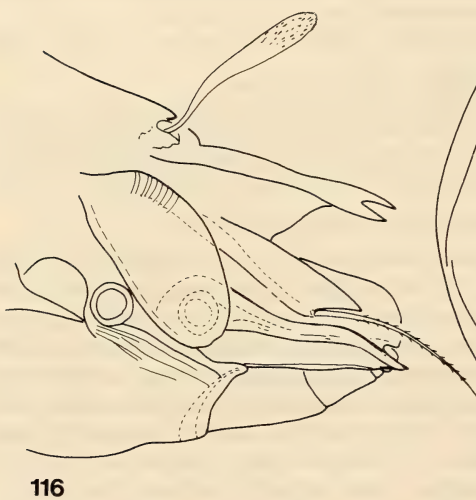
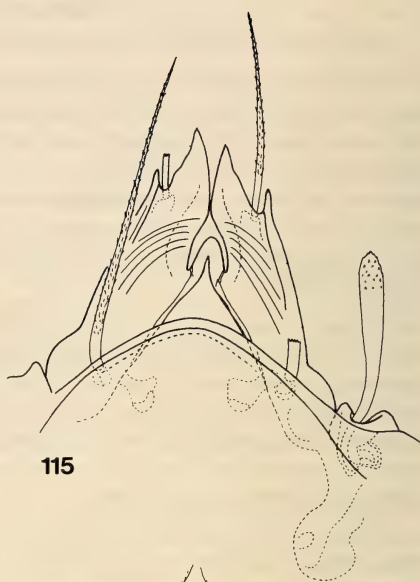
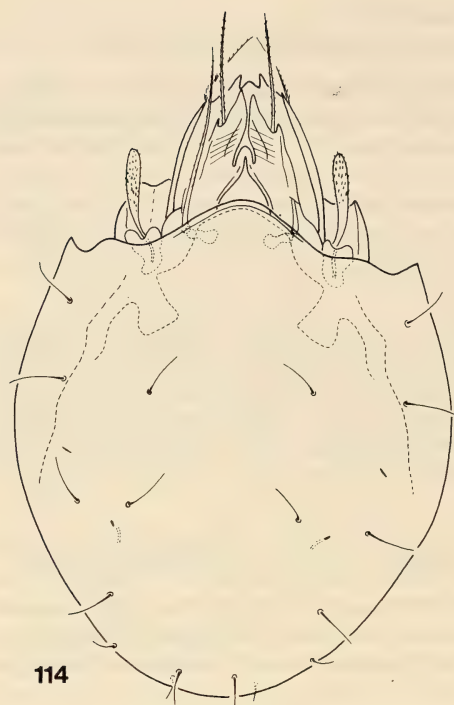
Oribatella malaya Balogh et Mahunka, 1974

This species was described by BALOGH and MAHUNKA (1974) from Kuala Lumpur only on the base of the type specimen. The recently collected material gives me now the possibility to complete the original description and to give also some figures.

Measurements: Length: 242-268 μm , width: 168-184 μm .

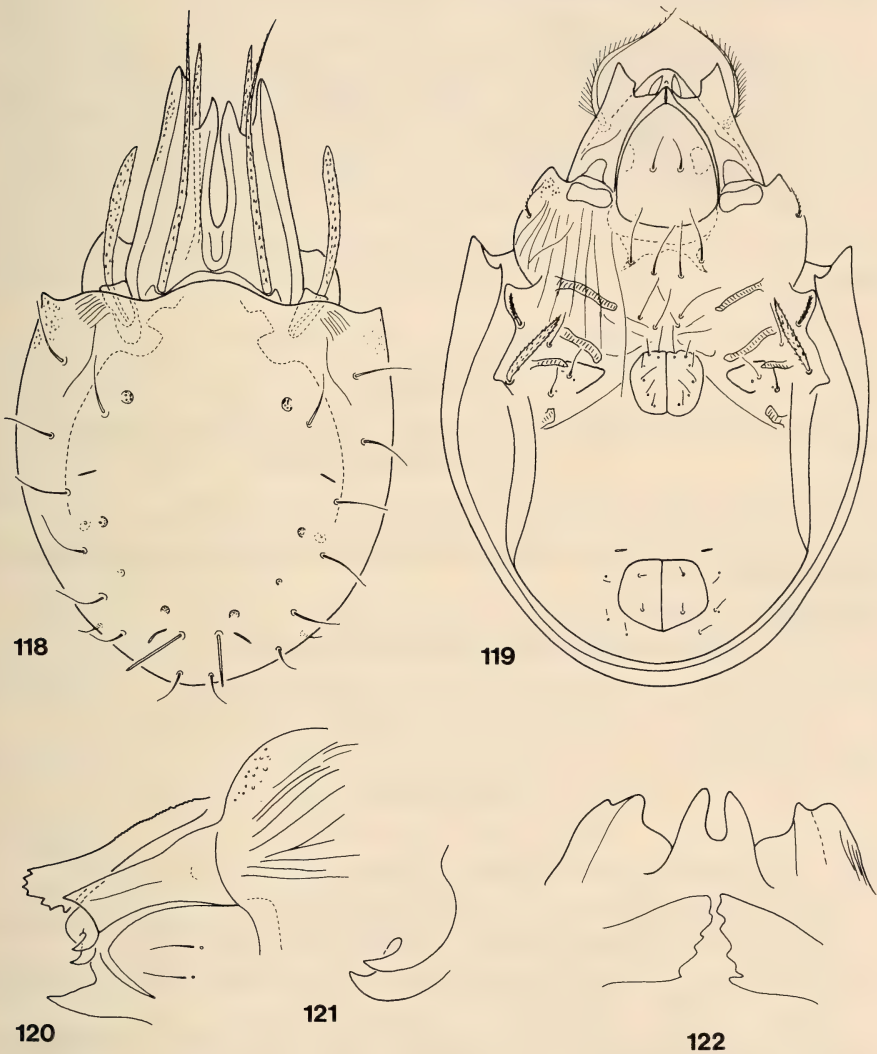
Dorsal side (Fig. 118): Rostrum with a deep incision medially (Fig. 122), beside it two long, curved teeth present (Fig. 121). Genal teeth much broadened and elongated, reaching far forward along rostrum. Rostral seta arising from a large tubercle, with very long cilia. Tutorium wide, its cuspis with 6-8 teeth, basal surface transversally striated (Fig. 123). Teeth of lamellar cuspis equal in size, inner one much shorter than outer one. Lamellae fused at their basis, surface laterally punctate. Sensillus (Fig. 124) very large, aciculate. Lamellar setae short, spiniform, interlamellar setae very long, reaching far out from lamellar cuspis. Surface of notogaster pitted and laterally, near to bothridium, some rugae present. Pteromorphae more strongly punctate. Ten pairs of notogastral setae present, nine pairs normal and setiform, one pair (r_1) strongly thickened, robust and straight.

Ventral side (Fig. 119): Epimeral and pedotectal surface with longitudinal lines, pedotecta also punctate at anterior margin. Epimeral setae of two types, setae *1a*, *1b*, *2a*, *3a*, *4a* and *4b* fine, very, long, thin and simple. Setae *1c* slightly, *3c* more strongly,



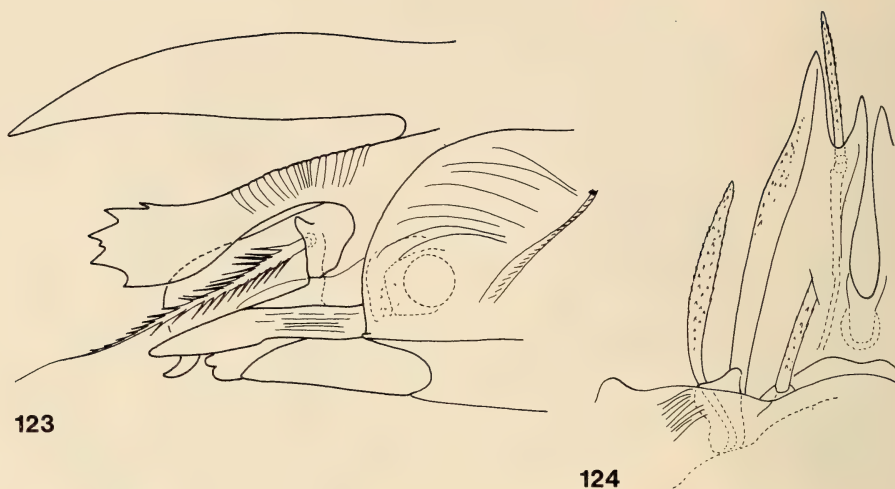
FIGS 114-117.

Lamellobates orientalis Csizsár, 1961 — 114: dorsal side; 115: lamellae;
116: prodorsum from lateral view; 117: ventral side.



FIGS 118-122.

Oribatella malaya Balogh et Mahunka, 1974 — 118: dorsal side; 119: ventral side; 120: mental region; 121: rostrum; 122: rostrum from anterior view.



FIGS 123-124.

Oribatella malaya Balog et Mahunka, 1974 — 123: prodorsum from lateral view;
124: sensillus and a part of lamellae.

4c very strongly thickened and barbed. Genital setae long, aggenital setae missing, anal and adanal setae minute.

All legs with one claw.

Material examined: Sab-82/27: 9 specimens.

REFERENCES

- AOKI, J. 1965. Oribatiden (Acarina) Thailands. I. *Nature Life S. E. Asia* 4: 129-193.
- 1965. Neue Oribatiden von der Insel Sado (Acarina: Oribatei). *Jap. J. Zool.* 14: 1-12.
- 1966. Oribatiden (Acarina) Thailands. II. *Nature Life S. E. Asia* 5: 189-207.
- 1973. Oribatid Mites from Iriomote-jima, the Southernmost Island of Japan (I). *Mem. natn. Sci. Mus. Tokyo* 6: 85-101.
- 1980. A revision of the Oribatid mites of Japan III. Families Protoplophoridae, Archoplophoridae and Mesoplophoridae. *Proc. Jap. Soc. Syst. Zool.* 18: 5-16.
- BALOGH, J. 1961. An outline of the family Lohmanniidae Berl., 1916 (Acari: Oribatei). *Acta zool. hung.* 7: 19-44.
- 1968. New Oribatids (Acari) from New Guinea. *Acta zool. hung.* 14: 259-285.
- 1970. New Oribatids (Acari) from New Guinea. II. *Acta zool. hung.* 16: 291-344.
- 1983. A partial revision of the Oppiidae Grandjean, 1954 (Acari: Oribatei). *Acta zool. hung.* 29: 1-79.

- BALOGH, J. and S. MAHUNKA. 1969. The scientific results of the Hungarian Soil Zoological Expeditions to South America. 10. Acari: Oribatids, collected by the second expedition. I. *Acta zool. hung.* 15: 1-21.
- 1969. The Zoological Results of the Hungarian Soil Zoological Expeditions to South America. 11. Acari: Oribatids from the Material of the Second Expedition, II. *Opusc. zool. Bpest* 9: 31-69.
- 1974. Oribatid species (Acari) from Malaysian soils. *Acta zool. hung.* 20: 243-264.
- BERLESE, A. 1914. Acari nuovi, manipulus IX. *Redia* 10: 113-150.
- CORPUZ-RAROS, L. A. 1979. Philippine Oribatei (Acarina). I. Preliminary List of Species and Descriptions of Forty New Species. *Philipp. Agric.* 62: 1-82.
- 1980. Philippine Oribatei (Acarina) V. Scheloribates Berlese and related genera (Oribatulidae). *Kalikasan, Philipp. J. Biol.* 9: 169-245.
- CSISZÁR, J. 1961. New Oribatids from Indonesian Soils (Acari). *Acta zool. hung.* 7: 345-366.
- HAMMER, M. 1966. Investigations on the Oribatid fauna of New Zealand. Part I. *Biol. Skr.* 15: 1-101.
- 1971. On some Oribatids from Viti Levu, the Fiji Islands. *Biol. Skr.* 15: 1-56.
- 1979. Investigations on the Oribatid Fauna of Java. *Biol. Skr.* 22: 1-79.
- 1981. On some Oribatid mites from Java — part II. *Acarologia* 22: 217-237.
- 1982. On a collection of oribatid mites from Bali, Indonesia (Acari: Cryptostigmata). *Entomologica scand.* 13: 445-464.
- MAHUNKA, S. 1977. Neue und interessante Milben aus dem Genfer Museum XX. Contribution to the Oribatid Fauna of S. E. Asia (Acari, Oribatida). *Revue suisse Zool.* 84: 247-274.
- 1986. A survey of the family Carabodidae C. L. Koch, 1836 (Acari: Oribatida). *Acta zool. hung.* 32: 73-135.
- 1987. Neue und interessante Milben aus dem Genfer Museum LV. Oribatids from Sabah (East Malaysia) I. (Acari: Oribatida) *Archs. Sci. Genève* 40: (in print).
- MAHUNKA, S. and L. MAHUNKA-PAPP. 1988. Neue und interessante Milben aus dem Genfer Museum LIX. *Hauseripes hungarorum* gen. n., sp. n. and some other new Tarsonemids from Sabah (East Malaysia) (Acari: Tarsonemina). *Revue suisse Zool.* (in print).
- RAMSAY, G. W. and J. G. SHEALS. 1969. Euphthiracaroid mites (Acari, Cryptostigmata) from North Borneo. *Bull. Br. Mus. (Nat. Hist.), Zool.*, 18: 93-115.
- SELLNICK, M. 1925. Javanische Oribatiden (Acar.). *Treubia* 6: 459-475.
- 1925. Fauna sumatrensis. Oribatidae (Acar.). *Supplta ent.* 11: 79-89.
- 1930. Zwei neue Oribatidengattungen aus Sumatra (Acar.). *Zool. Anz.* 86: 15-36.
- SENGBUSCH, H. G. 1982. Micronesian Oribatei. I. A new species of Haplacarus from Yap (Acari: Oribatei: Lohmanniidae). *Pacif. Insects* 24: 25-30.
- WALKER, N. A. 1964. Euphthiracaroida of California Sequoia litter; with a reclassification of the families and genera of the world. *Fort. Hays Stud. N.S., sci. Ser.* 3: 1-154.
- WILLMANN, C. 1931. XLI. Oribatei (Acari), gesammelt von der Deutschen Limnologischen Sunda-Expedition. *Arch. Hydrobiol., Suppl.* 9: 240-303.